

PROJECT MANUAL

BBS

ARCHITECTS
LANDSCAPE ARCHITECTS
ENGINEERS

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www.BBSARCHITECTURE.COM

FOR:

Phase I Capital Projects

At

Highview Elementary School
Lee F Jackson Elementary School
RJ Bailey Elementary School
Woodlands Middle / High School
Early Childhood Program

GREENBURGH CENTRAL SCHOOL DISTRICT
TOWN OF GREENBURGH, WESTCHESTER COUNTY

NEW YORK STATE EDUCATION
DEPARTMENT NUMBER:

S.E.D. NO. 66-04-07-06-0-002-013
S.E.D. NO. 66-04-07-06-0-006-011
S.E.D. NO. 66-04-07-06-0-005-012
S.E.D. NO. 66-04-07-06-0-007-022
S.E.D. NO. 66-04-07-06-0-011-008

B.B.S. PROJECT NUMBER:

21-188 – Highview ES
21-189 – Lee F Jackson ES
21-190 – RJ Bailey ES
21-191 – Woodlands MSHS
21-192 – Early Childhood Program

Issued to Bidders

DATE: May 27, 2022

ARCHITECTS CERTIFICATION

THE UNDERSIGNED CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE, INFORMATION, AND BELIEF, THE PLANS AND SPECIFICATIONS ARE IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF THE NEW YORK STATE UNIFORM FIRE PREVENTION AND BUILDING CODE, THE NEW YORK STATE ENERGY CONSERVATION CONSTRUCTION CODE, THE CONSTRUCTION STANDARDS OF THE EDUCATION DEPARTMENT, NEW YORK STATE DEPARTMENT OF LABOR RULE 56, EPA AND AHERA REQUIREMENTS.

LAWRENCE A. SALVESEN, A.I.A.
LIC. # 020623

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(Not Applicable)

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(Not Applicable)

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(Not Applicable)

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PROJECT DIRECTORY

Architects/Engineers:	BBS Architects & Engineer, P.C. 244 East Main Street Patchogue, NY 11772 (631) 475-0349 (631) 475-0361 FAX
Superintendent of Schools:	Dr. Linda J. Iverson 475 W Hartsdale Ave Hartsdale, NY 10530 (914) 761-6000 x 3103
Assistant Superintendent:	Lisa Raymond 475 W Hartsdale Ave Hartsdale, NY 10530 (914) 761-6000 x 3108
Director of Facilities:	Dennis Pugliese 475 W Hartsdale Ave Hartsdale, NY 10530 (914) 761-6000 x 3135
School District Attorney:	Jaspan Schlesinger LLP 300 Garden City Plaza Garden City, NY 11530 (516) 746-8000
Construction Manager:	None

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

BBS Architects, Landscape Architects and Engineers
P.C.

244 E Main Street

Patchogue, NY 11772

FILE NUMBER: 06-0559

LICENSE NUMBER: 28654

LICENSE CLASS: RESTRICTED

DATE OF ISSUE: 02/19/2021

EXPIRATION DATE: 02/28/2022

Duly Authorized Representative – Frederick Seeba:

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

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

Amy Phillips, Director
For the Commissioner of Labor

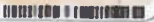
STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



FREDERICK W SEEBA
CLASS(EXPIRES)
I PD (04/22)

CERT# 90-01178
DMV# 166395801

MUST BE CARRIED ON ASBESTOS PROJECTS



CONDITIONS OF THIS CONTRACT

- A. Before attempting to deliver materials to the site, the Contractor shall inform the Owner's Representative so that arrangements can be made for places of entrance and inspection of materials being delivered.
- B. The Contractor shall provide written guarantee of the complete installations to be free from defects in materials and workmanship in accordance with Section 01700. Any portion of the work judged inferior shall be replaced by the Contractor at no additional cost to the Owner.
- C. The Contractor shall maintain operational exits, exit lights, danger signs, open trench markings, fire emergency equipment, night lights, and proper storage facilities for equipment and materials as directed through the length of the Contract.
- D. The Contractor shall be totally responsible for general site clean up and removal of all materials and equipment related to this Contract at the end of the Contract.
- E. The Contractor shall take over and maintain the site immediately after receiving the order to start work. Provide protection of property and utilities until work of the Contract is complete and accepted. The Contractor shall be responsible for the safety of any adjoining property, including paving, utility mains, pipes conduit, etc., and shall, at his own expense, protect and maintain same in at least as good a condition as that in which they were found.
- F. All seeded areas, pavements, walks, curbs, and approaches shall be kept clear at all times and, if disturbed by this construction work, shall be repaired and restored with materials to match existing.
- G. Before commencing any work, the Contractor shall verify all dimensions, coverage, and conditions prevalent at the job sites. If no corrections are brought to the attention of the School District and the Architect/Engineer before starting installation, the Contractor will be totally responsible for the installation providing complete coverage of the area designated.
- H. Upon completion of the work, the Contractor shall furnish as-built drawings showing the exact locations of every new item.
- I. It is assumed that Contractor's prices are based on scope of work complete and as confirmed by site(s) inspections prior to bidding.
- J. Contractor shall be responsible for all incidental electric and plumbing work required to complete work under this Contract.
- K. All repair and patching work shall be done in a professional manner. The Contractor shall take care to match new and existing surfaces and materials as closely as possible for a continuous finish where duplication is impossible.
- L. Equivalents: Where, in these specifications, kinds, types, brands, or manufacturers of materials are named, they shall be regarded as the

required standard of quality. Where two or more are named, these are presumed to be equal, and the Contractor may select one of those items. If the Contractor desires to use any kind, type, brand, or manufacturer of material other than those named in the specifications as the basis of the bid, the Contractor shall indicate in writing with the bid, within 72 hours after the bid, or prior to award of contract, what kind, type, brand, or manufacturer is included in the base bid for the specified items, and submit information describing in specific detail wherein it differs from the quality and performance required by the base specifications and such other information as may be required by the Owner. The Contractor may, at any time, propose to use in the work an equivalent item in lieu of that specified with no change in the bid amount.

- M. All prospective bidders shall be required to provide proof of demonstrated competence and experience in this type of work as outlined in these specifications, and each bidder must submit names and addresses of previous jobs completed by his firm which involved the type of work outlined in the specifications.
- N. At least three letters of reference for this type of work completed in the last five years shall be provided upon request, with pertinent company names and addresses of the firms for which the work was done indicating type of work, scope of work, and complete work. The district has the right to verify these letters as well as examine other aspects of the bidder's work record.
- O. As is usual with capital project payments, the district will retain five percent of each payment issued on verified requisitions for payment submitted by the Contractor. This retainage total will be paid upon satisfactory completion of all the work.
- P. The maximum gross weight of vehicles used shall not exceed 2,500 lbs. per wheel in the area of playgrounds and athletic fields. The equipment shall be equipped with flotation type tires. On the front lawns, the pounds per square inch exerted on the turf-grass shall not exceed 15 lbs. per square inch and on the back athletic area shall not exceed 32 pounds per square inch.
- Q. The Contractor shall be required to conform to all OSHA requirements regarding Lock-out/Tag-out procedures. This shall include, but not be limited to, disconnecting the power to any equipment to be serviced via a disconnect switch or breaker, locking out this power source, and tagging this lockout with appropriate wording as per OSHA requirements. This shall apply to any power source associated with this project.
- R. Certificate of Occupancy: During construction, school district personnel shall monitor the occupied portion of any school building to assure that it complies with the minimum requirements necessary to maintain a Certificate of Occupancy.
- S. Complaints: Boards of Education and BOCES shall follow procedures established under Section 155.4(d)(7) for the investigation and disposition of complaints relating to health and safety received as a result of construction and maintenance activities.

- T. Health and Safety Committee: Boards of Education and BOCES shall establish procedures for involvement of the health and safety committee to monitor safety during school construction projects.
- U. Emergency Plan: The district emergency plan shall be updated to reflect any changes necessary to accommodate the construction process.
- V. Fire Drills: Fire drills shall be held to familiarize students and staff with temporary exits and revised emergency procedures.
- W. Notification: Boards of Education and BOCES shall establish procedures for notification of parents, staff, and the community in advance of a construction project of \$10,000 or more.
- X. Fire and Hazard Prevention: The following shall be strictly enforced:
 - 1. During construction, daily inspections of district occupied areas shall be conducted by school district personnel to assure that construction materials, equipment, and debris do not block fire exits or emergency rescue windows.
 - 2. Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.
- Y. Radon: Districts shall take responsibility to be aware of the geological potential for high levels of radon and test and mitigate as appropriate.
- Z. Post Construction Inspection: The school district or BOCES shall provide the opportunity for a walk-through inspection by the health and safety committee members to confirm that the area is ready for occupancy.
- AA. Some of the proposed work may require various contractors to enter crawlspace or pipe tunnel areas, and/or access plenum spaces associated with the existing ceiling and wall systems (typical throughout). Please be advised that these spaces contain asbestos containing and/or asbestos contaminated materials. Any disturbance of said materials may result in the release of airborne asbestos fibers, therefore potentially creating a hazardous condition to the workers.

In accordance with 40 CFR Part 763, all contractors associated with this project are warned of the presence of the asbestos containing, and potentially asbestos contaminated materials within these spaces, and the potential hazard associated with the disturbance of these materials. Each contractor is required to have workers "certified and licensed to work in an asbestos hazard environment" to fulfill their contract requirements in these areas as part of their base bid. Per NYCRR 56, any person who may potentially disturb friable or non-friable asbestos during the course of any employment shall possess a valid restricted handler - allied trades certificate and shall have such certificate, or a copy thereof, in his or her possession at all times while working on the project. This person shall be aware of the health hazards of asbestos and take appropriate precautions to avoid any ACM, PACM or asbestos material disturbance throughout the course of their work. Abatement of any quantity of ACM, PACM or asbestos material is not allowed by this person under any circumstance.

The contractor shall notify the owners representative when work will be undertaken in these areas so that an independent monitoring firm can be available to monitor the activities within these spaces.

END OF SECTION

Invitation to Bidders

BOARD OF EDUCATION Greenburgh CSD

PUBLIC NOTICE: is hereby given for separate and single prime contract sealed bids for: **Phase 1 Capital Projects at Highview ES; Lee F Jackson ES; RJ Bailey ES; Woodlands MSHS; Early Childhood Program** Bids will be received by the School District, on **June 23, 2022 at 10:00 a.m.** in the **Administrative Office Annex , 475 W Hartsdale Ave, NY 10530**, and at said time and place where sealed proposals will be publicly read aloud either in person or by livestream, depending on the circumstances. If through livestream, viewing instructions will be sent through www.revplans.com. For precautionary reasons, if a livestream of the bid opening is necessary, bidders and other members of the public will not be admitted to the physical bid opening.

The Contract Documents may be examined at the Office of the Architect, **BBS Architects, Landscape Architects and Engineers, P.C., 244 East Main Street, Patchogue New York, (631-475-0349)**; however the Contract Documents may only be obtained thru the Office of **REV, 330 Route 17A Suite #2, Goshen New York 10924 (877-272-0216)** beginning on **May 27, 2022**. Complete digital sets of Contract Documents shall be obtained online (with a free user account) as a download for a **non-refundable fee of Forty-Nine (\$49.00) Dollars** at the following websites: www.bbsprojects.com or www.usinglesspaper.com under 'public projects'. Optionally, in lieu of digital copies, hard copies may be obtained directly from REV upon a **deposit of One Hundred (\$100.00) Dollars** for each complete set. **Checks for deposits shall be made payable to the DISTRICT, Greenburgh CENTRAL SCHOOL DISTRICT** and may be uncertified. All bid addenda will be transmitted to registered plan holders via email and will be available at the above referenced websites. Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs. Plan holders who have obtained hard copies of the bid documents will need to make the determination if hard copies of the addenda are required for their use, and coordinate directly with the printer for hard copies of addenda to be issued. There will be no charge for registered plan holders to obtain hard copies of the bid addenda. The bid deposit for hard copies will be returned upon receipt of plans and specifications, in good condition, within thirty days after bid date, except for the lowest responsible bidder, whose check will be forfeited upon the award of the contract.

A non-mandatory pre-bid site walk through for all trades will be conducted by on Thursday June 16, 2022 starting at 3:00 at the Woodlands MS / HS other schools to follow. Please contact the Greenburgh Schools Buildings and Grounds office at 914-761-6000 x 3135 for additional information.

The Contract will be awarded to the lowest responsible bidder or the proposals will be rejected within 45 days of the date of opening proposals. Bids shall be subject, however, to the discretionary right reserved by the School District to waive any informalities, accept or reject any alternatives, reject any proposals and to advertise for new proposals, if in its opinion the best interest of the School District will thereby be promoted.

Each bidder may not withdraw his bid within 45 days after the formal opening thereof. A bidder may withdraw his bid only in writing and prior to the bid opening date.

BY ORDER OF THE
BOARD OF EDUCATION
Greenburgh Central School District
Dated: May 27, 2022

INSTRUCTIONS TO BIDDERS

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1. DOCUMENTS (ISSUANCE AND RESTRICTIONS)

- A. Bid documents may be examined at the office of the Architect, Burton, Behrendt, and Smith, 244 East Main Street, Patchogue, New York, between the hours of 9 a.m. and 4 p.m. daily except Saturdays, Sundays, and holidays.
- B. A deposit, refundable in accordance with the Notice to Bidders, is required for each set of bid documents.
- C. Bid documents are comprised of: Instruction to Bidders, Form of Proposal, Contract Forms and Conditions, Addenda issued prior to bid date, and General and Technical requirements of the specifications and drawings.

2. QUALIFICATIONS OF BIDDERS

Bidders will be required to present documentation attesting that they:

- A. Have financial capability to produce and execute the project within the time periods specified.
- B. Possess a minimum of five (5) years continuous experience as a firm doing business under the same name, engaged principally as a contractor for the work proposed.
- C. Have completed at least five similar projects, listing type and scope of work, names and addresses of owners and dates of contract completion. The District has the right to verify the documentation as well as examine other aspects of the bidder's work record.
- D. Can provide tabulation of equipment and facilities at their

disposal to do this work.

- E. Have a current bonding capacity to accommodate proposed work.
- F. Have the experienced staff and technical organization for the project.
- G. Maintain an office with full-time employees in a commercial space.
- H. Intend to complete at least 25 percent of the Work with their own forces. General Conditions, Mobilization, etc. shall not count toward the 25 percent.
- I. The Bidder is not currently involved in bankruptcy proceedings.
- J. The Bidder is licensed to perform the work they are bidding on in the jurisdiction the work will take place.
- K. The Contractor and each Subcontractor must have a minimum of five (5) years experience in the work and/or applicable trade they will provide with their own forces.
- L. The bidder shall provide a complete Schedule of Values on an AIA form G703. Said Schedule shall be revised and resubmitted until satisfactory to the Architect. All project phases, activities and work items shall be broken out individually with lines for both labor and materials. In addition to this and to the required retainage, the Schedule of Values must be structured with the following minimum values:

General Conditions:	5% of overall contract value
Bonds and Insurance:	4% of overall contract value
Submittals:	1% of overall contract value
Punch List:	3% of overall contract value
Commissioning (if applicable):	TBD based on specific project
Closeout and O&M Manual:	2% of overall contract value
- M. It is assumed that in preparing this bid, the Bidder has already compiled this information, and that it is being made available for reference with completing this package. All information contained above in Items A through L must be submitted to the Architect prior to award of contracts. Failure to provide this information may result in disqualification of bidder.

3. COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS

- A. Bidder must comply with applicable federal, state, and local laws as well as all ordinances, rules, and regulations affecting work.
- B. The provisions of General Municipal Law, Section 103A, as it relates to refusal to testify or sign a waiver of immunity against prosecution and the submittal of bids and transactions with the State of New York, or a political subdivision thereof, governs work under this contract.
- C. Wage rates as determined by the New York State Industrial Commissioner pursuant to the labor laws of the State of New York

apply to all work under this contract.

- D. In accordance with the requirements of General Municipal Law section 103-g, the bidder is required to include with its bid either (1) the "Certification of Compliance with the Iran Divestment Act" or, in the case where the bidder is unable to make such certification (2) the form entitled "Declaration of Bidder's Inability to Provide Certification of Compliance with the Iran Divestment Act".

4. SINGLE PRIME CONTRACTS

- A. Where the project cost does not exceed \$1,500,000 and the Owner has decided to solicit bids from one general contractor, the Bidder shall submit with its bid a separate sealed list that names each subcontractor that the bidder will use to perform work in the contract, and the agreed-upon amount to be paid to each, for: (A) Plumbing and gas fitting; (B) Steam heating, hot water heating, ventilating and air condition apparatus and (C) Electric wiring and standard illuminating fixtures.

After the low bid is announced, the sealed list of subcontractors submitted with such low bid shall be opened and the names of such subcontractors shall be announced, and thereafter any change of subcontractor or agreed-upon amount to be paid to each shall require the approval of the public owner, upon a showing presented to the public owner of legitimate construction need for such change, which shall be open to public inspection.

5. EXAMINATION OF DOCUMENTS AND SITE

- A. Bidder shall visit sites of proposed work and be fully familiarized with conditions as they exist, as well as the character of the operations to be carried on under the proposed contract.
- B. Bidder shall make all necessary on-site investigations so as to understand facilities, difficulties, and restrictions attending the execution of the work including access to and conditions of the work sites and properties.
- C. Bidder shall examine and be familiar with the documents and forms delineating the work of the contract.
- D. Failure to receive or to examine any instrument, document, or to perform appropriate site investigations shall in no way relieve the bidder of responsibility for proposed contract for the consideration set forth in his bid.

6. AMBIGUITIES, INTERPRETATIONS, AND ADDENDA

- A. No oral interpretations, instructions, or explanation of the bid documents will be given prior to the opening of the bids. Discrepancies, ambiguities, or doubts as to the intent of the bidding document should be communicated to the Architect in writing for interpretation.

- B. Interpretations, clarifications, or corrections will be made in the form of addenda forwarded to each bidder at the address furnished by each bidder and receipt acknowledged on the form of proposal.

7. PRE-BID CONFERENCE

- A. When indicated in the Invitation to Bidders, a pre-bid conference will be held, at which time the Architect will have a representative available to respond to questions regarding the bid documents.
- B. Addenda clarifying pertinent questions or concerns raised at the pre-bid conference, requiring modification of the bid documents, will be issued for the record and become part of the bid documents.
- C. Notice as to the time and place of the pre-bid conference is stated in the Invitation to Bidders.

8. BASIS OF BID - PERFORMANCE AND QUALITY STANDARDS

- A. GENERAL: To establish performance and quality standards for the products, materials, and equipment required in the work, the Contract Documents detail performance criteria, or specify two or more items or materials which are presumed to be equal. This method of establishing a level of quality is not intended to exclude products that are equivalent in quality, performance, appearance, and function to those specified.
- B. EQUIVALENTS: The Bidder, at any time, may propose to use in the work an equivalent item in lieu of that specified with NO CHANGE to the Bid Amount. The Bidder, proposing to utilize this equivalent procedure, shall provide a detailed descriptive submission of the proposed material, equipment, or method being offered as equal to those specified, including an explanation of all deviations from the product specified in the Contract Documents. The Bidder is responsible to prove equality and, in that regard, shall supply all additional information requested by the Architect, as well as pay for any required testing to support these claims. Further, the Architect is to be the sole judge of product equivalency for the purpose intended, considering equality, workmanship, aesthetics, services, maintenance, economy, and reliability of operation.

If the Contractor has used equivalents as the basis of the bid, the "Proposed Equivalent Form", which is included in the Project Manual following the Bid Proposal Form, shall be submitted as an attachment to the Bid Form or within 72 hours after the bid or prior to the award of the contract. This form may be reproduced, if necessary, for a full listing of equivalents to be considered. This does not exclude the Bidder from submitting equivalents after the award of contract. The intent of this process is that, if the Bidder is already aware of an equivalency submission, the risk of acceptance can be reduced by verifying equivalency and, therefore, the bid price prior to award. The risk of whether proposed equivalents are accepted is borne by the Bidder.

- C. SUBSTITUTIONS: For consideration by the Owner, the Bidder may

propose to use in the work substitute items in lieu of those specified, which do not meet the project performance and quality criteria, and can be furnished and installed at a reduced cost (credit) to the Owner with no impact on the work being done by others.

1. Proposed substitutions must be submitted with the bid or within 72 hours after the bid or prior to the award of the contract, on the Proposed Substitution Form, which is in the Project Manual following the Proposed Equivalent Form. The Bidder must list any and all deviations from the Contract Documents as well as the corresponding credit amount to be deducted from the Base Bid Proposal if the substitution is accepted by the Owner. This does not exclude the Bidder from submitting a substitution for consideration after the award of Contract.
2. Substitutions cannot be used as the basis of the bid, they must be listed separately and will be evaluated on a case by case basis. All base bid amounts must be based on the specified materials or acceptable equivalents.
3. In no way will the proposed substitutions influence the successful bidder selection process. Substitutions may not be used to arrive at the lowest qualified bid amount.
4. If a substitution is accepted, the Bidder shall coordinate the installation of the substitute and make all associated changes required. The Bidder also waives any claim for additional cost associated with the substitute which becomes apparent before, during, or after installation. The Bidder agrees to bear any and all additional costs to all other contractors or subcontractors which are caused by the incorporation of the substitution.

9. PREPARATION, IDENTIFICATION, AND SUBMISSION OF PROPOSAL

- A. Bidders shall submit triplicate copies of Form of Proposal (one marked 'Official Tender' and others marked 'Copy'), properly signed and completed in every respect as per these Instructions to Bidders, in an opaque, sealed envelope plainly and prominently marked:

"Sealed Bid for (Project Name) _____

Bid Date _____, 20____, by (Name/Address of Bidder)."

- B. Attached to the Form of Proposal envelope, Bidders shall submit a separate and sealed envelope clearly marked 'Bid Security,' which shall contain copies of the 'Bid Security,' as called for in these Instructions to Bidders. The name and address of the Surety Company providing the Bid Bond shall be written on the outside of the envelope containing the Bid Security.
- C. All bids shall be held for a period of forty-five (45) days after their receipt and opening, during which time the Owner has the right to enter into a contract, and the bid securities of the three

(3) lowest bidders shall be held until the execution of the Contract.

- D. The Owner reserves the right to waive any irregularities in the submission of bids. Once the Form of Proposal has been submitted in the sealed envelope, there shall be no alterations or amendments; external markings or separate supplementary information shall, in no way, affect the sealed bid information. Any necessary adjustment to the proposal shall be made prior to its submission and shall be part of the enclosed sealed bid.
- E. A bidder may withdraw his bid, either in person or by telegraphic or written request, at any time prior to the scheduled closing time for the receipt of bids. Negligence on the part of the bidder in preparing his bid confers no right for the withdrawal of the bid after it has been opened.

10. BID SECURITY

- A. Proposal must be accompanied by bid security of not less than five percent (5%) of the amount of bid, which may be a certified check, cashier's check, bank draft, or bid bond executed by a Surety Company authorized to do business in the State of New York and made payable to the Owner.
 - 1. Bid Security shall be submitted in a separate sealed envelope clearly identifying the company and project as well as the name and address of the Surety Company.
 - 2. Each bond must be accompanied by a Power of Attorney, giving names of Attorneys-in-fact, and the extent of their bonding authority. All bonds shall be countersigned by a resident Agent and with a Surety Company or Corporation meeting the following qualifications:
 - a. Surety must be licensed to do business in the State of New York.
 - b. Surety shall be listed on the current U.S. Treasury Department Circular 570 entitled "Companies Holding Certificates of Authority" from the Secretary of the Treasury under the Act of Congress approved July 30, 1974 (6 U.S.C., Sec. 6-13), as Acceptable Sureties on Federal Bonds.
 - c. Surety must meet minimum rating requirements as published in current "Best's Key Rating Guide" as listed below:
 - 1. For contracts not exceeding \$250,000, the following shall apply for all bonding companies holding a certified guarantee agreement form, the Small Business Administration (a copy of said agreement must accompany the bond).

Contract

Financial Size Policy Holder

INSTRUCTIONS TO BIDDERS-6

Rev. 01-26-17

Amount	Category	Rating
\$0-(But not including)\$100,000	Class VI	B
\$100,000-(But not including) \$250,000	Class VIII	B

2. On all other bonds, the Surety shall be rated as equal to "A" or better as to "Policy Holder Ratings" and "XI" or better as to "Financial Size Category" by "Best's Key Rating Guide."

3. Limitations:

a. Bonding limits or bonding capacity refers to the limit or amount of bond acceptable on any one project.

b. The bonding limit for each contractor shall not exceed the amount listed on the above referenced U.S. Treasury Department List for the Surety issuing the bond.

4. All Surety companies are subject to approval and may be rejected by the Owner without cause, in the same manner that bids may be rejected.

5. Compliance: In the event any of the requirements outlined herein are not complied with, the Owner shall have the right to reject the bid or annul the Award of the Contract.

B. Bid security will be returned to all except the three lowest bidders, after formal analysis and evaluation of bids. No bid will be withheld beyond the forty-five (45) day period stipulated above.

C. Remaining bid security will be returned to bidders after Owner and successful bidder have executed the Agreement and the Owner has received and approved performance and payment bonds.

D. If the required agreement has not been executed within the specified period of time after the bid opening, bid security of any bidder will be returned upon his request, provided he has not been notified of acceptance of his bid prior to the date of his request.

11. RECEIPT AND OPENING OF BIDS

Bids will be received up to the time and at the location indicated for the opening in the Invitation to Bidders, after which they will be visibly opened and read aloud, and the contents made known to all interested parties present.

12. MODIFICATION OR WITHDRAWAL OF PROPOSAL

A. Bid may not be modified after it has been deposited with Owner.

- B. Bid may not be withdrawn after time set for receipt of bids.
- C. Withdrawn bid may not be resubmitted.
- D. Bid withdrawn after opening of bids will result in forfeiture of bid security.

13. DISQUALIFICATION OF PROPOSAL

- A. The Bidder acknowledges the right of the Owner to reject any or all bids.
- B. Bid may be disqualified and rejected under any or all of the following conditions:
 - 1. If the Bidder fails to furnish the required bid security, or to submit data required by the Contract Documents, or if the Bid is in any way incomplete or irregular.
 - 2. If the Bid has not been deposited at the designated location prior to the date and time for receipt as indicated in the Bid Advertisement of these "Instructions to Bidders."
 - 3. If there is reason to believe that a bidder has submitted more than one bid for the same project.
 - 4. Or, if there is reason to believe that collusion exists among the bidders.
 - 5. Failure to establish to Owner's satisfaction:
 - a. Proof of ownership, control, or ability to procure necessary plant and equipment to commence the work at the time prescribed and thereafter prosecute and complete at the rate, or within the time specified.
 - b. That he is not already obligated by prior commitment to other work as to likely delay start, prosecution, or completion of the work required by the contract.
 - c. That he proposes to use reliable and responsible subcontractors or suppliers.

14. AWARD OF CONTRACT

- A. The contract will be awarded to the lowest qualified responsible bidder, provided his bid is reasonable and it is in the best interest of the Owner to accept.
- B. Owner may determine the lowest bid by adding one base bid to other base bid(s) and/or by adding to or deducting from those base bid(s), additive or deduct alternates, or substitutions, if any, which the Owner elects to accept after the opening of bids.

15. EXECUTION OF CONTRACT

- A. Form of Agreement as prepared by Owner shall be Standard Form of

Agreement between Owner and Contractor, A.I.A. Form A101.

- B. Contracts shall be executed in triplicate within ten (10) days after notification of award at which time the successful contractor shall deliver to the Owner all the necessary counterparts of the Contract in the form set forth in the Bid and Contract Documents.
- C. Performance and payment bonds shall be submitted in the form of A.I.A. Document A312, Pages 1 through 6, covering performance as well as labor and material payment and extended for the period of time stipulated in Article 11 of the General and/or Supplementary General Conditions, "Bonds and Insurance". An executed bond must be issued by surety company licensed in New York State.
- D. At the time of execution of the Contract and prior to the start of construction operations, the successful bidder shall furnish Certification of Insurance in the form and amounts stipulated under the section of the specification describing insurance requirements.
- E. Schedule of Values, as per A.I.A. Form G702A, provide breakdown of costs.

16. TAXES AND PERMITS

- A. Material purchased for use in the construction of buildings owned by the State, County, municipality, or political subdivision are exempt from Federal excise and State sales taxes when such materials are incorporated into and become part of the completed improvement.
- B. Materials, appliances, tools, equipment, or fuel costs which do not become part of the completed improvement will be subject to all applicable taxes.
- C. The Owner is not subject to Federal Tax on transportation of property.
- D. Local Building Permit will not be required.
- E. Exemption certificates will be furnished by Owner for purchases of materials where material is to be incorporated into work, upon receipt of a copy of the supplier's invoice showing items, net prices, and federal excise tax separately.

17. SUBCONTRACTOR'S LISTING

For multiple prime contracts, a listing of all subcontractors and major material suppliers (including address, telephone number, and name of individual to contact) whose services are proposed to be employed on the project shall be submitted within 15 days after signing of the contract.

18. TIME OF COMPLETION

- A. Bidder shall agree to start work upon receipt of notice to proceed, and complete within the number of calendar days specified in the Form of Proposal.

B. The construction milestone schedule shall be as follows -

General

- Bid Opening – June 23, 2022
- Award of contract – July BOE meeting July 6, 2022 TBD
- Bonds and Insurance submitted – July 13, 2022
- Start of work all schools – July 18, 2022

Highview ES

- Substantial Completion of roof – October 7, 2022
- Substantial Completion of interior work – August 26, 2022
- Substantial Completion of mechanical work – August 26, 2022

Lee F Jackson ES

- Substantial Completion of mechanical and electrical work - August 26, 2022

Bailey ES

- Substantial Completion of interior renovation work – August 26, 2022
- Substantial Completion of mechanical ventilation system work – September 23, 2022
- Substantial Completion of unit ventilator installation work – December 30, 2022
- Substantial Completion of electrical work – December 30, 2022

Woodlands MS / HS

- Substantial Completion of interior renovation work - August 26, 2022
- Substantial Completion of mechanical ventilation system work – August 26, 2022
- Substantial Completion of electrical work – August 26, 2022

Early Childhood Program

- Substantial Completion of interior renovation work – August 26, 2022
- Substantial Completion of unit ventilator installation and mechanical system work – December 30, 2022
- Substantial Completion of electrical work – December 30, 2022

19. CONDITIONS OF WORK OPERATIONS

- A. Work under Contract shall be executed and pursued without interruption of or interference with the school operations.
- B. Work operations, access to buildings, and extent of movement of personnel within buildings shall be coordinated with and limited by School Authorities.
- C. Contractor shall notify School Authorities at least 24 hours in advance to advise of intended work operations to be scheduled and receive approval prior to starting work.

END OF SECTION

INFORMATION AVAILABLE TO BIDDERS

BBS Architects, Landscape Architects and Engineers, P.C., (BBS), accepts no responsibility for information contained within the items listed below that have been provided by others.

Any questions concerning information contained within these items shall be forwarded via the standard Request for Information process. BBS will forward these Requests for response by the appropriate party.

- A. Roof inspection report Highview ES asbestos and lead survey - prepared by Enviroscience, dated 11/21
- B. Asbestos containing material content report for Highview ES; Lee F Jackson; RJ Bailey; Woodlands MS HS and ECP - prepared by Enviroscience, dated - 3/31/22
- C. PCB containing material report for Highview ES; Lee F Jackson; RJ Bailey; Woodlands MS HS and ECP prepared by Enviroscience, dated 3/31/22
- D. Lead containing material content report for Highview ES; Lee F Jackson; RJ Bailey; Woodlands MS HS and ECP - prepared by Enviroscience, dated 3/31/22

END OF SECTION

Limited Environmental Survey

**Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, New York 10530**

**Highview Elementary School
200 North Central Avenue
Hartsdale, New York 10530**

November 2021



2150 Smithtown Ave., Suite 3, Ronkonkoma, NY 11779
T: 631.580.3191 • F: 631.580.3195 • W: envirohealth.org

Limited Environmental Survey

Highview Elementary School

200 North Central Avenue

Hartsdale, NY 10530

November 2021

Enviroscience Project No. 21600

Prepared for: Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530

Prepared by: ENVIROSCIENCE CONSULTANTS	
2150 Smithtown Avenue	37 Moore Avenue
Ronkonkoma, NY 11779	Mount Kisco, NY 10549
(631) 580-3191	(914) 864-1699

Asbestos: Drew Cheskin
Drew Cheskin NYS Asbestos Certificate: 05-04280

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Survey for Asbestos

<u>Section</u>	<u>Title</u>
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2.0	Asbestos Survey
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2.2	Asbestos Sampling Procedures

Appendices

Appendix A	Asbestos Bulk Sample Results
Appendix B	Asbestos Bulk Sample Location Drawings
Appendix C	Asbestos Containing Materials Location Drawings
Appendix D	Photo Log
Appendix E	Certifications

1.0 EXECUTIVE SUMMARY

Greenburgh Central School District (Greenburgh) retained Enviroscience Consultants to conduct a limited asbestos survey of Highview Elementary School, located at 200 North Central Avenue, Hartsdale, NY. The purpose of this survey was to identify and quantify asbestos containing materials (ACM) which may be affected by proposed repair/replacement of sections of roofing at the school. The survey was performed on October 28th, 2021.

Asbestos

Analytical results of the bulk samples collected by Enviroscience Consultants indicate that the following materials **contain asbestos** (greater than 1-percent);

- **None**

Asbestos-containing materials (ACM) may only be removed or disturbed by a certified and licensed asbestos abatement contractor. Project monitoring for asbestos abatement projects by an independent project-monitoring firm under contract of the Owner is required. All other materials tested negative for asbestos.

For each survey conducted, the inspector classifies ACM or Assumed ACM materials by friability and condition. This helps to determine the extent of damage in certain areas as well as the potential for further damage and Asbestos release due to disturbance of the material.

Material Location	Material	Quantity*	Friability	Condition
N/A	N/A	N/A	N/A	N/A

* All quantities in this assessment are estimations and should be confirmed by the abatement contractor prior to submitting a proposal.

Condition Definitions:

Good: None/Minimal apparent damage to ACM

Fair: Up to 10% localized damage or up to 25% of the entire ACM is damaged

Poor: Over 10% localized damage or over 25% of the entire ACM is damaged

2.0 ASBESTOS SURVEY

2.1 Asbestos Survey Procedures

The asbestos survey was designed to meet all requirements specified by *NYS Asbestos Code Rule, 12 NYCRR Part 56, Subpart 56-5.1 Asbestos Survey Requirements for Building/Structure Demolition, Renovation, Remodeling and Repair*. The asbestos survey was conducted by New York State certified asbestos inspectors/New York City certified asbestos investigators. Sample analysis was performed by Enviroscience Consultants, a New York State Department of Health Environmental Laboratory Approval Program accredited laboratory.

New York State requires that the asbestos survey information be transmitted by the building owner as follows:

- One copy of the completed asbestos survey shall be sent by the owner or their agent to the local government entity charged with issuing a permit for such demolition, renovation, remodeling or repair work under applicable State or local laws.
- The completed asbestos survey for controlled demolition or pre-demolition asbestos projects shall also be submitted to the appropriate Asbestos Control Bureau district office.
- The completed asbestos survey shall be kept on the construction site with the asbestos notification and variance, if required, throughout the duration of the asbestos project and any associated demolition, renovation, remodeling or repair project.

Enviroscience Consultants conducted the site survey based on discussions with, and on-site guidance from, Jim Weydig of BBS Architects. It should be noted that only exterior roofing materials were included in this inspection. As the final scope of work is developed and finalized, it may be necessary to revisit the school to access interior building materials which may be affected by roof repair/replacement work.

Material systems were assigned into groups of homogeneous materials. A homogeneous material is defined as a material that is alike in color and texture that was installed at the same time. Samples were then collected from each homogeneous area according to USEPA AHERA

requirements. Based upon sample results, each sampled homogeneous area was classified as either asbestos or non-asbestos containing. An asbestos containing material is defined by the USEPA as a material containing greater than one percent asbestos by weight.

New York State certified Asbestos Inspector Investigator Drew Cheskin (cert. #05-04280) conducted the survey on October 28th, 2021. Certifications are provided in Appendix E. The inspector entered all accessible areas to identify and sample suspect asbestos containing materials. Please reference Asbestos Bulk Sample Location Drawings in Appendix B. Asbestos-containing materials (ACM) are noted above in the Executive Summary and in this section. Also reference the Asbestos Bulk Sample Results in Appendix A and Asbestos Containing Materials Location Drawings in Appendix C.

Photographs in Appendix D are typical and do not show all of the asbestos materials that they represent.

Any asbestos containing materials that will be disturbed during renovations or demolition must be removed by a New York State certified and licensed asbestos abatement contractor. Project monitoring is required for asbestos projects

Analytical results of the bulk samples collected by Enviroscience Consultants indicate that the following materials are **classified as non-asbestos containing** (less than or equal to 1-percent) and may be removed or disturbed as regular construction materials:

- Built-up Roof (Roof B)
- Perlite Insulation (Roof B)
- Built-up Roof (Roof A)
- Perlite Insulation (Roof A)
- Vapor Barrier (Roof A)
- Flashing, Roll-on Roofing (Roofs A & B)
- Flashing, Built-up Roofing (Roofs A & B)
- Flashing, Tar (Roofs A & B)
- Mechanical Equipment, Flashing, Roll-on Roofing (Roofs A & B)
- Mechanical Equipment, Flashing, Built-up Roofing (Roofs A & B)
- Mechanical Equipment, Flashing, Tar (Roofs A & B)
- Drain Flashing Tar (Roofs A & B)

- Tar on Curbs/Eaves Flashing (Roofs A & B)

Refer to Bulk Sample Results #31637 for detailed sample information.

The following materials are **classified as non-suspect** (not considered suspect asbestos containing materials by EPA or NYS DOL) and may be removed or disturbed as regular construction materials:

- Metal Roof Deck

The following **locations were not inspected** due to inaccessibility or the destructive nature of the testing and inability to repair the building component. Should work in these areas reveal previously un-sampled suspect asbestos containing materials, all activities in the area(s) must stop immediately until proper sample collection and laboratory analysis has been performed:

- Interior locations/materials which may be affected by roof repair/replacement work

2.2 Asbestos Sampling Procedures

Samples of suspect asbestos materials were collected in accordance with United States Environmental Protection Agency guidelines as outlined below. These sampling procedures were implemented in an effort to minimize the release of asbestos fibers during sampling and to provide control of samples through analysis and reporting.

- Samples were collected in unoccupied areas.
- Surfaces of the material to be sampled were wetted with water mist prior to collection.
- Samples were collected with a cork borer, knife, or other approved sampling tool.
- Sampling tools were decontaminated between each sample.
- Individual sealable containers were used to contain each of the collected samples.
- Samples were double-bagged for transportation to the laboratory.
- Sample containers were labeled with a date and unique sample ID number using a permanent marker.

At the completion of sampling activities, bulk samples were relinquished to the laboratory for analysis. Enviroscience Consultants, Inc. is a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program accredited environmental testing laboratory (ELAP #11681). The laboratory is also accredited by the National Voluntary Laboratory Accreditation Program, (NVLAP Lab Code 200531-0).

All asbestos bulk samples were analyzed by Polarized Light Microscopy (PLM). Samples of cellulose ceiling tiles, and non-friable organically bound (NOB) materials such as floor tiles and roofing material, that were found to contain less than 1% asbestos by PLM were then analyzed using Transmission Electron Microscopy (TEM). According to the Department of Health, NOB materials may first be analyzed by PLM. If asbestos is not found using PLM, the sample must be analyzed with the higher-powered transmission electron microscope.

Appendix A
Asbestos Bulk Sample Results

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	10/28/2021
PROJECT NAME:	Highview ES - Roof Survey	DATE RECEIVED:	10/29/2021
JOB #:	21600	AREA:	Roofs
PAGE #:	1 of 4	SAMPLER:	Drew Cheskin
		CUSTODY #:	31637

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
01-01	Built-up Roof	Black	Roof B	None Detected by TEM		1.8% fiberglass	96.5% organics and carbonates 1.7% silicates and opaque
01-02	Built-up Roof	Black	Roof B	None Detected by TEM		3.8% fiberglass	92.4% organics and carbonates 3.8% silicates and opaque
02-03	Perlite Insulation	Brown	Roof B	None Detected		75.0% cellulose	15.0% perlite 10.0% binders
02-04	Perlite Insulation	Brown	Roof B	None Detected		75.0% cellulose	15.0% perlite 10.0% binders
03-05	Built-up Roof	Black	Roof A	None Detected by TEM		2.3% fiberglass	95.3% organics and carbonates 2.4% silicates and opaque
03-06	Built-up Roof	Black	Roof A	None Detected by TEM		3.6% fiberglass	92.8% organics and carbonates 3.6% silicates and opaque
04-07	Perlite Insulation	Brown	Roof A	None Detected		75.0% cellulose	15.0% perlite 10.0% binders

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by: John F. Spillitto Date Analyzed: 11/4/2021

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	10/28/2021
PROJECT NAME:	Highview ES - Roof Survey	DATE RECEIVED:	10/29/2021
JOB #:	21600	AREA:	Roofs
PAGE #:	2 of 4	SAMPLER:	Drew Cheskin
		CUSTODY #:	31637

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
04-08	Perlite Insulation	Brown	Roof A	None Detected		75.0% cellulose	15.0% perlite 10.0% binders
05-09	Vapor Barrier	Black	Roof A	None Detected by TEM		None Detected	99.2% organics and carbonates 0.8% silicates and opaque
05-10	Vapor Barrier	Black	Roof A	None Detected by TEM		None Detected	99.8% organics and carbonates 0.2% silicates and opaque
06-11	Flashing, Roll-on Roofing	Gray/Black	Roof A	None Detected by TEM		15.6% fiberglass	60.9% organics and carbonates 23.5% silicates and opaque
06-12	Flashing, Roll-on Roofing	Gray/Black	Roof B	None Detected by TEM		15.4% fiberglass	61.5% organics and carbonates 23.1% silicates and opaque
07-13	Flashing, Built-up Roofing	Black	Roof A	None Detected by TEM		5.2% fiberglass	89.5% organics and carbonates 5.3% silicates and opaque
07-14	Flashing, Built-up Roofing	Black	Roof B	None Detected by TEM		5.8% fiberglass	88.5% organics and carbonates 5.7% silicates and opaque

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

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Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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PAGE #:	3 of 4	SAMPLER:	Drew Cheskin
		CUSTODY #:	31637

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
08-15	Flashing, Tar	Black	Roof A	None Detected by TEM		None Detected	99.9% organics and carbonates 0.1% silicates and opaque
08-16	Flashing, Tar	Black	Roof B	None Detected by TEM		None Detected	96.9% organics and carbonates 3.1% silicates and opaque
09-17	Mechanical Equipment, Flashing, Roll-on Roofing	Gray/Black	Roof A	None Detected by TEM		11.4% fiberglass	71.5% organics and carbonates 17.1% silicates and opaque
09-18	Mechanical Equipment, Flashing, Roll-on Roofing	Gray/Black	Roof B	None Detected by TEM		2.7% fiberglass	93.1% organics and carbonates 4.2% silicates and opaque
10-19	Mechanical Equipment, Flashing, Built-up Roofing	Black	Roof A	None Detected by TEM		6.5% fiberglass	87.0% organics and carbonates 6.5% silicates and opaque
10-20	Mechanical Equipment, Flashing, Built-up Roofing	Black	Roof B	None Detected by TEM		7.2% fiberglass	85.5% organics and carbonates 7.3% silicates and opaque
11-21	Mechanical Equipment, Flashing, Tar	Black	Roof A	None Detected by TEM		5.4% fiberglass	46.3% organics and carbonates 48.3% silicates and opaque

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

This report may not be reproduced without the express permission of EnviroScience. This report cannot be used to claim endorsement of products by NVLAP or any agency of the U.S. Government. Test results only reflect conditions at the time the samples were taken.

Analyzed by:



Date Analyzed: 11/4/2021

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	10/28/2021
PROJECT NAME:	Highview ES - Roof Survey	DATE RECEIVED:	10/29/2021
JOB #:	21600	AREA:	Roofs
PAGE #:	4 of 4	SAMPLER:	Drew Cheskin
		CUSTODY #:	31637

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
11-22	Mechanical Equipment, Flashing, Tar	Black	Roof B	None Detected by TEM		2.4% fiberglass	88.1% organics and carbonates 9.5% silicates and opaque
12-23	Drain Flashing Tar	Black	Roof A	None Detected by TEM		12.9% talc	56.9% organics and carbonates 30.2% silicates and opaque
12-24	Drain Flashing Tar	Black	Roof B	None Detected by TEM		3.0% fiberglass	93.9% organics and carbonates 3.1% silicates and opaque
13-25	Tar on Curbs/Eaves Flashing	Black	Roof A	None Detected by TEM		None Detected	99.9% organics and carbonates 0.1% silicates and opaque
13-26	Tar on Curbs/Eaves Flashing	Black	Roof B	None Detected by TEM		None Detected	99.5% organics and carbonates 0.5% silicates and opaque

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

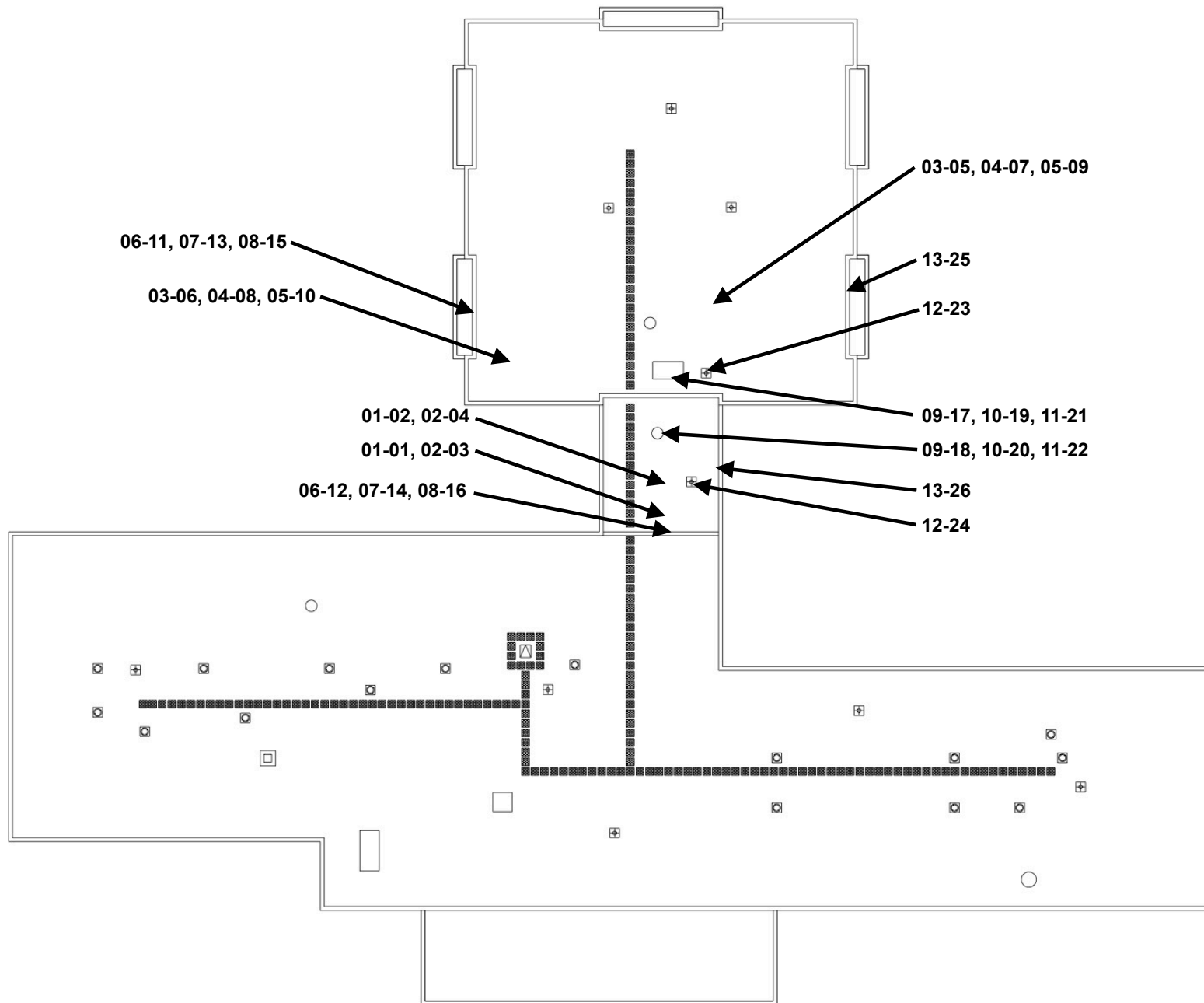
Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

This report may not be reproduced without the express permission of EnviroScience. This report cannot be used to claim endorsement of products by NVLAP or any agency of the U.S. Government. Test results only reflect conditions at the time the samples were taken.

Analyzed by: John F. Spillitto Date Analyzed: 11/4/2021

Appendix B
Asbestos Bulk Sample Location Drawings



ENVIROSCIENCE
CONSULTANTS, INC
 2150 SMITHTOWN AVENUE
 RONKONKOMA, NY 11779
 (631) 580-3191
 FAX 580-3195
 www.envirohealth.org

KEY PLAN
 NO SCALE

PROJECT

HIGHVIEW ELEMENTARY SCHOOL
 200 NORTH CENTRAL AVENUE
 HARTSDALE, NEW YORK 10530

CLIENT

GREENBURGH CENTRAL SCHOOL DISTRICT

PROJECT #: 21600

COMMENTS:
 ASBESTOS BULK SAMPLE LOCATION PLAN

NOT TO SCALE

Date: 11/09/2021

By: Drew Cheskin

DRAWING 1 of 1

Appendix C

Asbestos Containing Materials Location Drawings (NOT APPLICABLE)

Appendix D

Photo Log



Non-asbestos Containing Roofing Materials



Non-asbestos Containing Flashing Materials



Non-asbestos Containing Mechanical Equipment Flashing Materials



Non-asbestos Containing Drain Flashing Tar



Non-Asbestos Containing Tar on Curbs/Eaves Flashing

Appendix E

Certifications

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Enviroscience Consultants, Inc.

2150 Smithtown Avenue

Ronkonkoma, NY 11779

FILE NUMBER: 99-0882

LICENSE NUMBER: 28733

LICENSE CLASS: RESTRICTED

DATE OF ISSUE: 11/13/2020

EXPIRATION DATE: 11/30/2021

Duly Authorized Representative – Glenn Neuschwender:

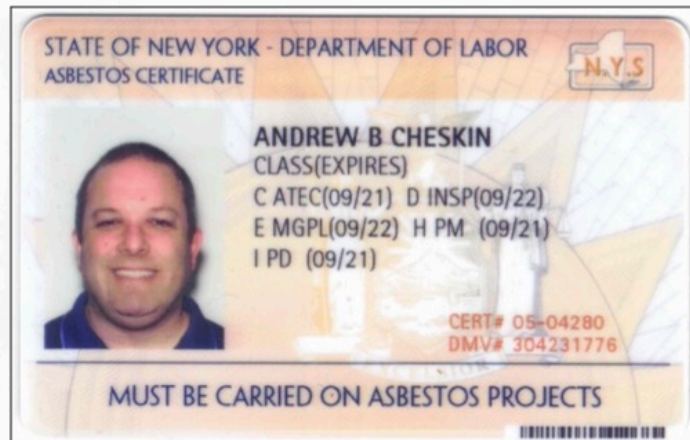
This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with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

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



Eileen M. Franko, Director
For the Commissioner of Labor

SH 432 (8/12)



NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2022
Issued April 01, 2021
Revised October 19, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

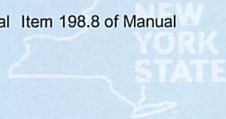
MR. GLENN L. NEUSCHWENDER
ENVIROSCIENCE CONSULTANTS, LLC
2150 SMITHTOWN AVENUE SUITE 3
RONKONKOMA, NY 11779

NY Lab Id No: 11681

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

Miscellaneous

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



Department
of Health

Serial No.: 63960

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

Page 1 of 1

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Enviroscience Consultants, LLC

2150 Smithtown Ave.

Suite 3

Ronkonkoma, NY 11779

Mr. Edward Detweiler

Phone: 631-580-3191 Fax: 631-580-3195

Email: edetweiler@envirohealth.org

<http://www.envirohealth.org>

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 200531-0

Bulk Asbestos Analysis

Code

Description

18/A01

EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

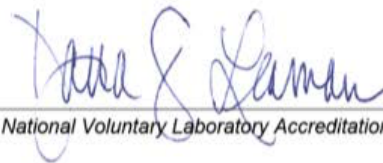
Airborne Asbestos Analysis

Code

Description

18/A02

U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



For the National Voluntary Laboratory Accreditation Program

Effective 2021-10-01 through 2022-09-30

Page 1 of 1

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200531-0

Enviroscience Consultants, LLC
Ronkonkoma, NY

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2021-10-18 through 2022-09-30
Effective Dates




For the National Voluntary Laboratory Accreditation Program

Limited Environmental Survey

Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530

Highview Elementary School
200 North Central Avenue
Hartsdale, NY 10530

March 2022



2150 Smithtown Ave., Suite 3, Ronkonkoma, NY 11779

T: 631.580.3191 • F: 631.580.3195 • W: envirohealth.org

ASBESTOS & LEAD SURVEY REPORT

Highview Elementary School

200 North Central Avenue

Hartsdale, NY 10530

March 2022

Enviroscience Project No. 21819

Prepared for: Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530

Prepared by: ENVIROSCIENCE CONSULTANTS, LLC.
2150 Smithtown Avenue
Ronkonkoma, NY 11779
(631) 580-3191

37 Moore Avenue
Mount Kisco, NY 10549
(914) 864-1699

Asbestos / Lead Inspector: Drew Cheskin
Drew Cheskin
NYS Asbestos Certificate: 05-04280
NYS/EPA Lead Risk Assessor: LBP-R-11931-1

Asbestos / Lead Inspector: Glen Bornhoft
Glen Bornhoft
NYS Asbestos Certificate: 15-12111

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>
1.0	Executive Summary
2.0	Asbestos Survey
2.1	Asbestos Survey Procedures
2.2	Asbestos Sampling Procedures
3.0	Lead-based Paint Inspection
3.1	Lead Inspection Procedures
3.2	Lead Sampling Results

Appendices

Appendix A	Asbestos Bulk Sample Results
Appendix B	Asbestos Bulk Sample Location Drawings
Appendix C	Asbestos Containing Materials Location Drawings
Appendix D	Lead XRF Results
Appendix E	Photo Log
Appendix F	Certifications

1.0 EXECUTIVE SUMMARY

Greenburgh Central School District retained Enviroscience Consultants, LLC. to conduct a limited asbestos & lead survey at Highview Elementary School, 200 North Central Avenue, Hartsdale, New York. The purpose of this survey was to identify and quantify asbestos containing materials (ACM) & Lead-based paint (LBP) that may be affected by proposed renovations within the building.

The survey was performed on January 12th, 2022, and based upon written and verbal communications with Jim Weydig of BBS Architects (BBS). Floor plans with highlighted areas were provided, but no architectural, renovation, demolition or proposed construction plans were provided, and no comprehensive written scope of work was available at the time of the survey. As a result, the survey consisted of inspecting the highlighted areas of the provided floor plans, and with the guidance from BBS, sampling or testing accessible materials for asbestos or lead content. No destructive or invasive measures were used to identify or sample materials, and live electrical and operating mechanical systems were not accessed for inspection. Upon receipt of finalized architectural drawings, additional sampling may be required.

Asbestos

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials **contain asbestos** (greater than 1-percent);

- None

The following materials were not sampled, but are **presumed to contain asbestos** (greater than 1-percent) based on historical testing of similar materials;

- Electrical Wire Insulation

For each survey conducted, the inspector classifies ACM or Assumed ACM materials by friability and condition. This helps to determine the extent of damage in certain areas as well as the potential for further damage and Asbestos release due to disturbance of the material.

Material Location	Material	Quantity*	Friability	Condition
Fan Room	Electrical Wire Insulation	20 LF**	Yes	Good

* All quantities in this assessment are estimations. An abatement contractor should perform a site walk through and calculate quantities prior to submitting a proposal.

** Assumed material. Not sampled due to live electrical.

Condition Definitions:

Good: None/Minimal apparent damage to ACM

Fair: Up to 10% localized damage or up to 25% of the entire ACM is damaged

Poor: Over 10% localized damage or over 25% of the entire ACM is damaged

Asbestos-containing materials (ACM) may only be removed or disturbed by a certified and licensed asbestos abatement contractor. Project monitoring for asbestos abatement projects by an independent air-monitoring firm under contract of the Owner is required, with air sampling being required for most projects. All other materials tested negative for asbestos.

Lead

An EPA certified lead risk assessor used an X-ray Fluorescence (XRF) analyzer to inspect the building in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision. OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount.

The following surfaces were identified with lead levels above the HUD Guideline definition of greater than 1.0 milligram per square centimeter (mg/cm²):

- Metal, Door Frame, Green, Lower Level - Lobby (to Gymnasium)
- Metal, Glass Partition, Green, Lower Level - Lobby (to Gymnasium)
- Metal, I-Beam, Green, Lower Level - Lobby (to Gymnasium)
- Metal, Door Frame, White, Lower Level - Gymnasium
- Metal, I-Beam, White, Upper Level - Corridor

A full list of components sampled as part of the Lead-based Paint Survey is included in Section 3.0.

2.0 ASBESTOS SURVEY

2.1 Asbestos Survey Procedures

The asbestos survey was designed to meet all requirements specified in the *NYS Asbestos Code Rule, 12 NYCRR Part 56, Subpart 56-5.1 Asbestos Survey Requirements for Building/Structure Demolition, Renovation, Remodeling and Repair*. The asbestos survey was conducted by New York State certified asbestos inspectors. Sample analysis was performed by Enviroscience Consultants, LLC., a New York State Department of Health Environmental Laboratory Approval Program accredited laboratory.

New York State requires that the asbestos survey information be transmitted by the building owner as follows:

- One copy of the completed asbestos survey shall be sent by the owner or their agent to the local government entity charged with issuing a permit for such demolition, renovation, remodeling or repair work under applicable State or local laws.
- The completed asbestos survey for controlled demolition or pre-demolition asbestos projects shall also be submitted to the appropriate Asbestos Control Bureau district office.
- The completed asbestos survey shall be kept on the construction site with the asbestos notification and variance, if required, throughout the duration of the asbestos project and any associated demolition, renovation, remodeling or repair project.

Enviroscience performed a site investigation of target areas within the building that included a visual inspection of all accessible areas designated for renovation. Material systems were assigned into groups of homogeneous materials. A homogeneous material is defined as a material that is alike in color and texture that was installed at the same time. Samples were then collected from each homogeneous area according to USEPA AHERA requirements. Based upon sample results, each sampled homogeneous area was classified as either asbestos or non-

asbestos containing. An asbestos containing material is defined by the USEPA as a material containing greater than one percent asbestos by weight.

New York State certified Asbestos Inspector Drew Cheskin (cert. #05-04280) and New York State certified Asbestos Inspector Glen Bornhoft (cert. #15-12111) conducted the survey on January 12th, 2022. Certifications are provided in Appendix F. The inspectors entered all accessible areas to identify and sample suspect asbestos containing materials. Please reference Asbestos Bulk Sample Location Drawings in Appendix B. Asbestos-containing materials (ACM) are noted above in the Executive Summary and in this section. Also reference the Asbestos Bulk Sample Results in Appendix A and Asbestos Containing Materials Location Drawings in Appendix C.

Photographs in Appendix E are typical and do not show all of the asbestos materials that they represent.

Any asbestos containing materials that will be disturbed during renovation or demolition must be removed by a New York State certified and licensed asbestos abatement contractor. Air monitoring is required for most asbestos projects.

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials are **classified as non-asbestos containing** (less than or equal to 1-percent) and may be removed or disturbed as regular construction materials:

- CMU Mortar, Gray (Lower Level - Fan Room)
- Terrazzo Floor, Green (Lower Level - Lobby)
- 2'x2' Ceiling Tile, Type 1, White (Lower Level - Lobby & Upper Level - Corridor)
- 2'x2' Ceiling Tile, Type 2, White (Lower Level - Lobby)
- Fire Door Insulation, Brown (Lower Level – Gymnasium Doors)
- Gym Floor Mastic, Cream (Lower Level – Gymnasium)
- Vinyl Cove Base Mastic, Brown (Lower Level – Gymnasium)
- 2'x2' Ceiling Tile, Type 3, White (Lower Level – Gymnasium)
- CMU Mortar, Gray (Lower Level – Gymnasium)
- 12"x12" Floor Tile, White (Elevator)

Refer to the Bulk Sample Results #32071 for detailed sample information.

The following materials are **classified as non-suspect** (not considered suspect asbestos containing materials by EPA or NYS DOL) and may be removed or disturbed as regular construction materials:

- Brick
- CMU
- Concrete
- Fiberglass Pipe Insulation w/Hard Fiberglass Elbows
- Rubber/Vinyl Wire Insulation
- Stone

The following **locations were not inspected** due to inaccessibility, the destructive nature of the testing and inability to repair the building component, live electrical or active mechanical components, or by directive of the client. Should work in these areas reveal previously un-sampled suspect asbestos containing materials, these materials must be **assumed asbestos containing** and all activities in the area(s) must stop immediately until proper sample collection and laboratory analysis has been performed:

- Electrical wiring in the fan room appeared to be wrapped in suspect braided wire insulation. The material could not be sampled due to live electrical.
- Interior of air handlers/duct work systems

2.2 Asbestos Sampling Procedures

Samples of suspect asbestos materials were collected in accordance with United States Environmental Protection Agency guidelines as outlined below. These sampling procedures were implemented in an effort to minimize the release of asbestos fibers during sampling and to provide control of samples through analysis and reporting.

- Samples were collected in unoccupied areas.
- Surfaces of the material to be sampled were wetted with water mist prior to collection.
- Samples were collected with a cork borer, knife, or other approved sampling tool.
- Sampling tools were decontaminated between each sample.
- Individual sealable containers were used to contain each of the collected samples.
- Samples were double-bagged for transportation to the laboratory.

- Sample containers were labeled with a date and unique sample ID number using a permanent marker.

At the completion of sampling activities, bulk samples were relinquished to the laboratory for analysis. Enviroscience Consultants, LLC. is a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program accredited environmental testing laboratory (ELAP #11681). The laboratory is also accredited by the National Voluntary Laboratory Accreditation Program, (NVLAP Lab Code 200531-0).

All asbestos bulk samples were analyzed by Polarized Light Microscopy (PLM). Samples of cellulose ceiling tiles, and non-friable organically bound (NOB) materials such as floor tiles and roofing material, that were found to contain less than 1% asbestos by PLM were then analyzed using Transmission Electron Microscopy (TEM). According to the Department of Health, NOB materials may first be analyzed by PLM. If asbestos is not found using PLM, the sample must be analyzed with the higher-powered transmission electron microscope.

3.0 LEAD-BASED PAINT INSPECTION

3.1 Lead Inspection Procedures

Enviroscience Consultants, LLC. conducted a limited Lead-based Paint Inspection throughout select interior locations of Highview Elementary School. The purpose of the limited Lead-based Paint Inspection was to identify surfaces and building components which may be coated with lead-based paint. An EPA certified lead inspector/risk assessor used an X-ray Fluorescence (XRF) analyzer to test building components in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision.

3.2 Lead Sampling Results

Tested components and surfaces include:

- Metal, Fan Unit, Gray, Lower Level - Fan Room
- Metal, I-Beam, Red, Lower Level - Fan Room
- Metal, Ceiling Joist, Black, Lower Level - Fan Room
- Metal, Spare Ducting, Gray, Lower Level - Fan Room
- Metal, Fan Unit, Light Gray, Lower Level - Fan Room

- Metal, Drain Pipe, Black, Lower Level - Fan Room
- Metal, Door, Tan, Lower Level - Fan Room
- Metal, Door Frame, Tan, Lower Level - Fan Room
- Metal, Door, Aqua, Lower Level - Lobby (to Gymnasium)
- Metal, Door, Black, Lower Level - Lobby (to Gymnasium)
- Metal, Door Frame, Green, Lower Level - Lobby (to Gymnasium)
- Metal, Glass Partition, Green, Lower Level - Lobby (to Gymnasium)
- Metal, I-Beam, Green, Lower Level - Lobby (to Gymnasium)
- CMU, Wall, Cream, Lower Level - Lobby (to Gymnasium)
- Block, Wall, Green, Lower Level - Lobby (to Gymnasium)
- Metal, Door, Red, Lower Level - Gymnasium
- Metal, Door, Black, Lower Level - Gymnasium
- Metal, Door Frame, White, Lower Level - Gymnasium
- Metal, Glass Partition, White, Lower Level - Gymnasium
- Metal, Glass Partition, White, Lower Level - Gymnasium
- Metal, Door Frame, White, Lower Level - Gymnasium
- Metal, I-Beam, Black, Lower Level - Gymnasium
- CMU, Wall, Cream, Lower Level - Gymnasium
- Metal, Door, Gray, Elevator
- Metal, Door Frame, Gray, Elevator
- Metal, Interior, Light Gray, Elevator
- Metal, Ceiling, White, Elevator
- CMU, Wall, Cream, Elevator
- Block, Wall, Green, Elevator
- Metal, Glass Partition, White, Upper Level - Corridor
- Metal, I-Beam, White, Upper Level - Corridor
- CMU, Wall, Yellow, Upper Level - Corridor
- Metal, Glass Partition, White, Upper Level - Corridor
- Metal, I-Beam, White, Upper Level - Corridor
- CMU, Wall, Yellow, Upper Level - Corridor

Lead amounts greater than or equal to 1.0 mg/cm² have been identified in the components listed below:

- **Metal, Door Frame, Green, Lower Level - Lobby (to Gymnasium)**
- **Metal, Glass Partition, Green, Lower Level - Lobby (to Gymnasium)**

- **Metal, I-Beam, Green, Lower Level - Lobby (to Gymnasium)**
- **Metal, Door Frame, White, Lower Level - Gymnasium**
- **Metal, I-Beam, White, Upper Level - Corridor**

All other surfaces and components tested for lead-based paint were below 1.0 mg/cm². All workers involved in construction and demolition activities are covered under The OSHA Lead Exposure in Construction Rule (29 CFR 1926.62). OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount. This standard requires workers to be trained and protected from lead exposure by use of engineering controls, respiratory protection, protective clothing and medical surveillance when airborne concentration of lead exceed established personal exposure limit (PEL) levels.

Complete Lead XRF Results are located in Appendix D.

Please reference Enviroscience Consultants, LLC. certifications in Appendix F.

Appendix A
Asbestos Bulk Sample Results

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/12/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/18/2022
JOB #:	21819	AREA:	Highview ES
PAGE #:	1 of 3	SAMPLER:	Drew Cheskin
		CUSTODY #:	32071

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
01-01	CMU Mortar	Gray	Lower Level - Fan Room	None Detected		3.0% cellulose	97.0% cement
01-02	CMU Mortar	Gray	Lower Level - Fan Room	None Detected		3.0% cellulose	97.0% cement
02-03	Terrazzo Floor	Green	Lower Level - Lobby	None Detected		2.0% cellulose	98.0% cement
02-04	Terrazzo Floor	Green	Lower Level - Lobby	None Detected		2.0% cellulose	98.0% cement
03-05	2'x2' Ceiling Tile, Type 1	White	Lower Level - Lobby	None Detected by TEM		37.6% mineral wool	24.8% organics and carbonates 37.6% silicates and opaques
03-06	2'x2' Ceiling Tile, Type 1	White	Upper Level - Corridor	None Detected by TEM		37.2% mineral wool	25.7% organics and carbonates 37.1% silicates and opaques
04-07	2'x2' Ceiling Tile, Type 2	White	Lower Level - Lobby	None Detected by TEM		32.6% mineral wool	34.8% organics and carbonates 32.6% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

This report may not be reproduced without the express permission of Enviroscience. This report cannot be used to claim endorsement of products by NVLAP or any agency of the U.S. Government. Test results only reflect conditions at the time the samples were taken.

Analyzed by:



Date Analyzed:

1/27/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/12/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/18/2022
JOB #:	21819	AREA:	Highview ES
PAGE #:	2 of 3	SAMPLER:	Drew Cheskin
		CUSTODY #:	32071

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
04-08	2'x2' Ceiling Tile, Type 2	White	Lower Level - Lobby	None Detected by TEM		33.1% mineral wool	33.8% organics and carbonates 33.1% silicates and opaques
05-09	Fire Door Insulation	Brown	Lower Level - Gymnasium Doors	None Detected		90.0% cellulose	10.0% binders
05-10	Fire Door Insulation	Brown	Lower Level - Gymnasium Doors	None Detected		90.0% cellulose	10.0% binders
06-11	Gym Floor Mastic	Cream	Lower Level - Gymnasium	None Detected by TEM		None Detected	65.3% organics and carbonates 34.7% silicates and opaques
06-12	Gym Floor Mastic	Cream	Lower Level - Gymnasium	None Detected by TEM		None Detected	63.7% organics and carbonates 36.3% silicates and opaques
07-13	Vinyl Cove Base Mastic	Brown	Lower Level - Gymnasium	None Detected by TEM		None Detected	86.1% organics and carbonates 13.9% silicates and opaques
07-14	Vinyl Cove Base Mastic	Brown	Lower Level - Gymnasium	None Detected by TEM		None Detected	86.0% organics and carbonates 14.0% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by:



Date Analyzed:

1/27/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/12/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/18/2022
JOB #:	21819	AREA:	Highview ES
PAGE #:	3 of 3	SAMPLER:	Drew Cheskin
		CUSTODY #:	32071

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
08-15	2'x2' Ceiling Tile, Type 3	White	Lower Level - Gymnasium	None Detected by TEM		60.8% mineral wool	18.9% organics and carbonates 20.3% silicates and opaques
08-16	2'x2' Ceiling Tile, Type 3	White	Lower Level - Gymnasium	None Detected by TEM		59.2% mineral wool	21.1% organics and carbonates 19.7% silicates and opaques
09-17	CMU Mortar	Gray	Lower Level - Gymnasium	None Detected		3.0% cellulose	97.0% cement
09-18	CMU Mortar	Gray	Lower Level - Gymnasium	None Detected		3.0% cellulose	97.0% cement
10-19	12"x12" Floor Tile	White	Elevator	None Detected by TEM		None Detected	61.2% organics and carbonates 38.8% silicates and opaques
10-20	12"x12" Floor Tile	White	Elevator	None Detected by TEM		None Detected	61.0% organics and carbonates 39.0% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

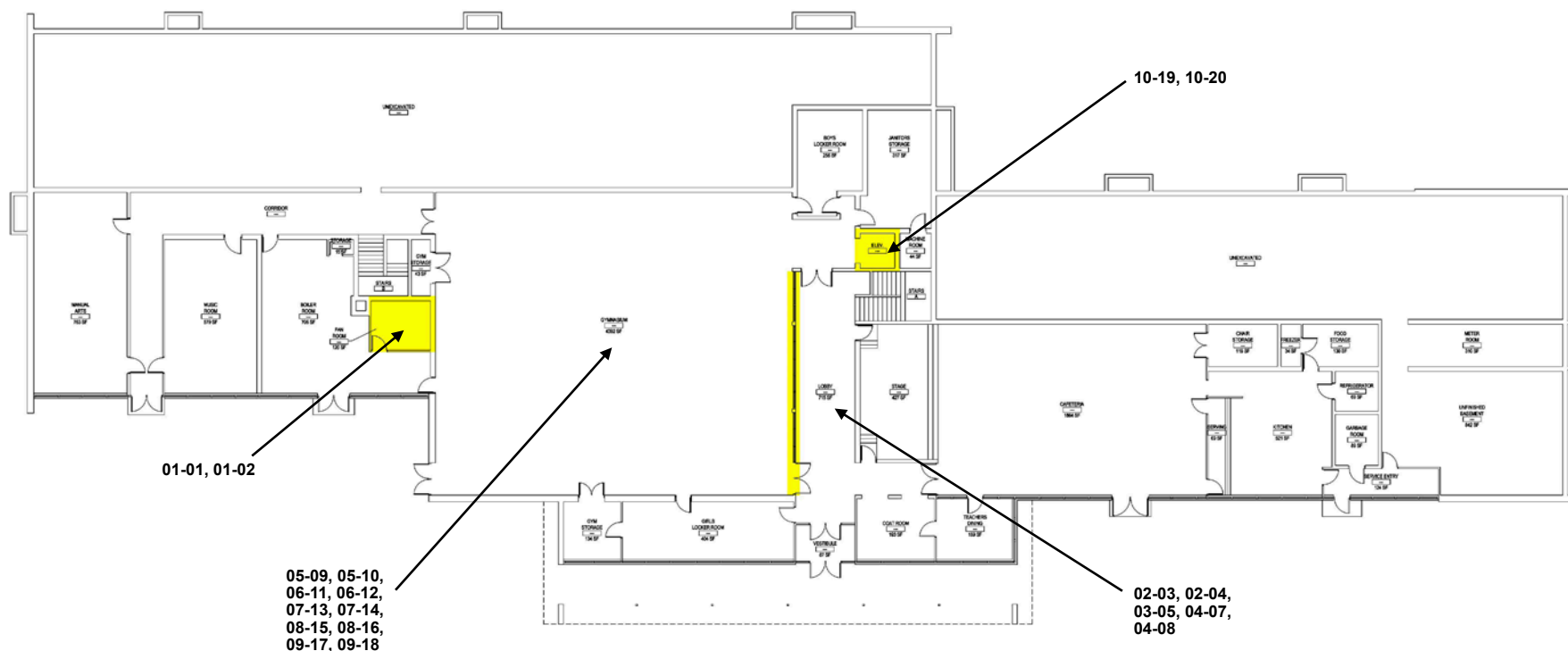
Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

This report may not be reproduced without the express permission of EnviroScience. This report cannot be used to claim endorsement of products by NVLAP or any agency of the U.S. Government. Test results only reflect conditions at the time the samples were taken.

Analyzed by: John F. Spillotti Date Analyzed: 1/27/2022

Appendix B
Asbestos Bulk Sample Location Drawings

**HIGHVIEW ELEMENTARY SCHOOL
LOWER LEVEL**



01-01, 01-02

05-09, 05-10,
06-11, 06-12,
07-13, 07-14,
08-15, 08-16,
09-17, 09-18

10-19, 10-20

02-03, 02-04,
03-05, 04-07,
04-08



ENVIROSCIENCE
CONSULTANTS, INC
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN
NO SCALE

PROJECT

**DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS**

CLIENT

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

COMMENTS:
HIGHVIEW ELEMENTARY SCHOOL
LOWER LEVEL
BULK SAMPLE LOCATION PLAN

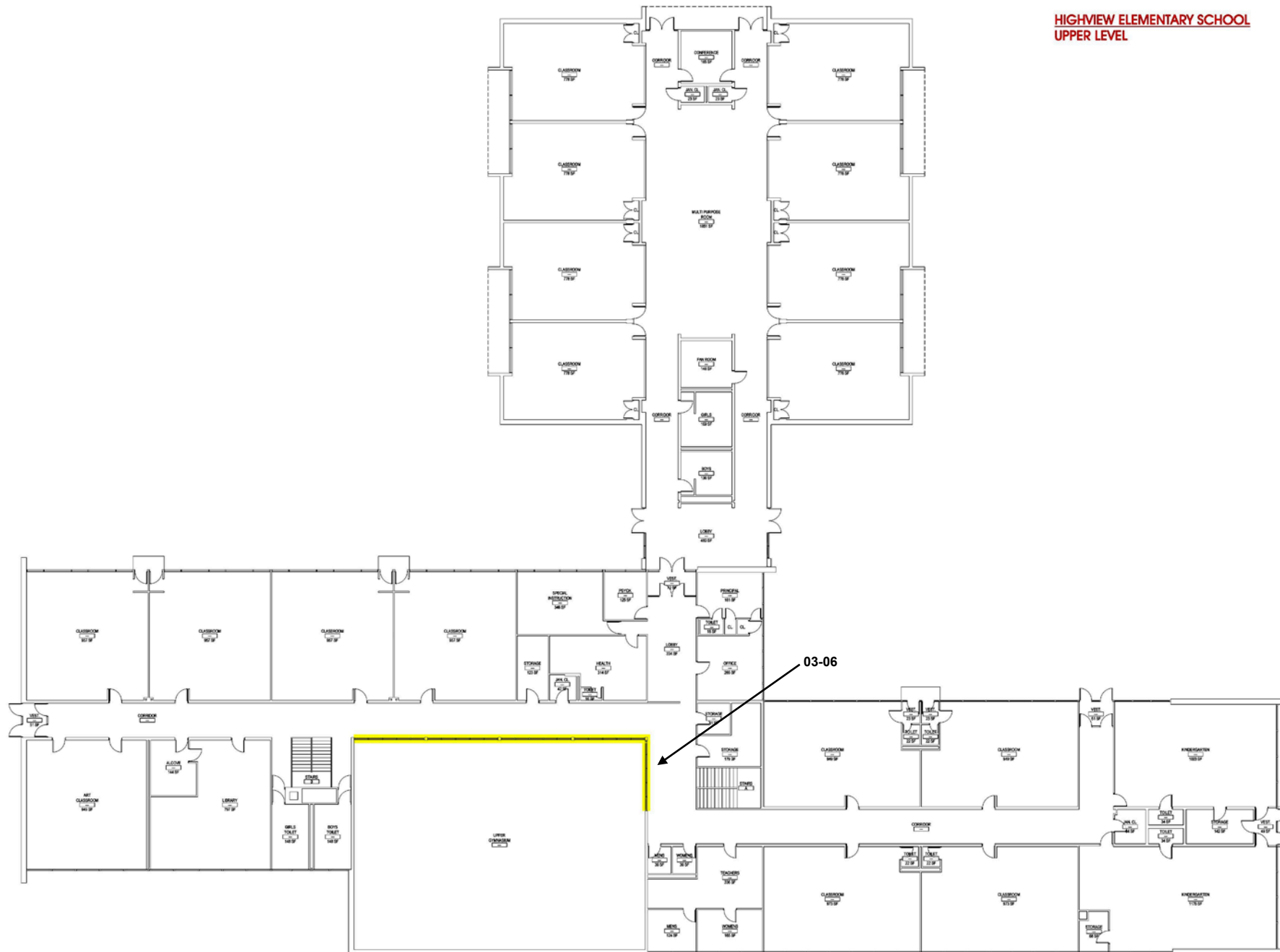
NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 1 of 2

**HIGHVIEW ELEMENTARY SCHOOL
UPPER LEVEL**



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FAX 580-3195
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KEY PLAN
NO SCALE

PROJECT
CLIENT

**DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS**

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

COMMENTS:
**HIGHVIEW ELEMENTARY SCHOOL
UPPER LEVEL
BULK SAMPLE LOCATION PLAN**

NOT TO SCALE

Date: 03/08/2022
By: Drew Cheskin

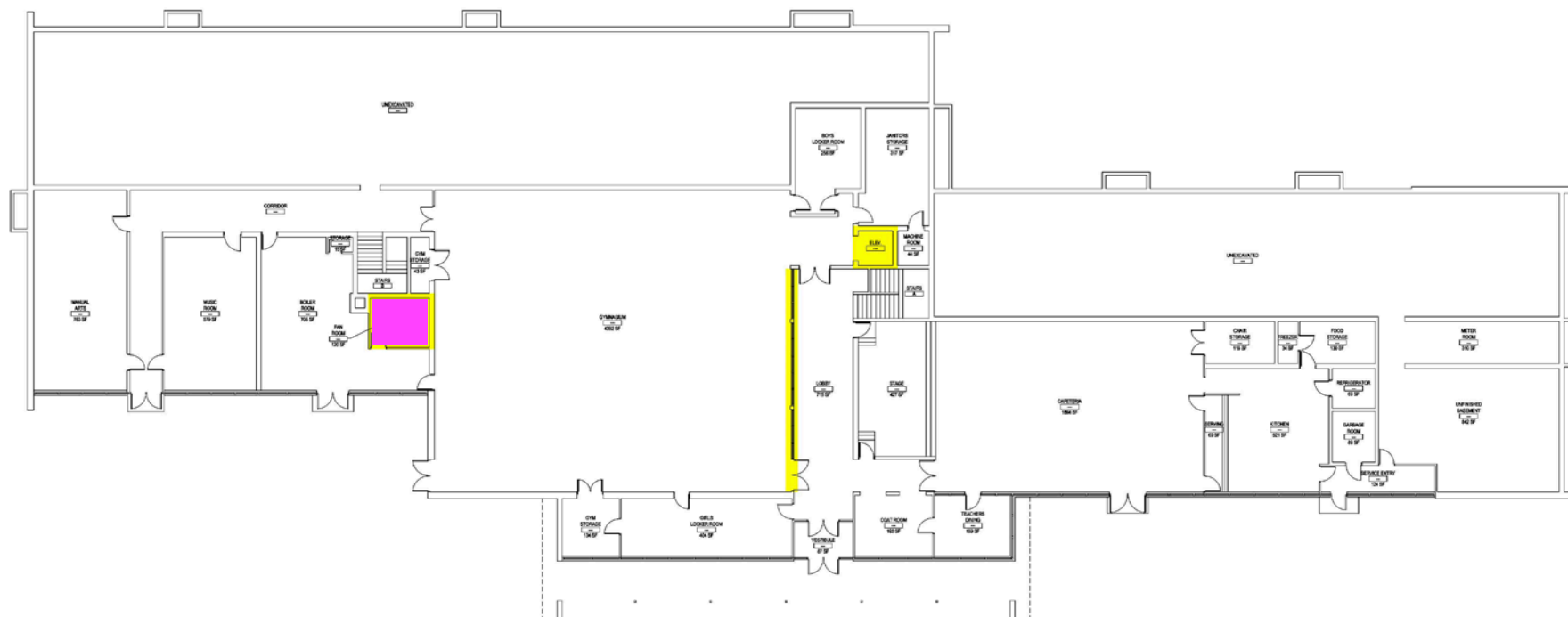
DRAWING 2 of 2

Appendix C

Asbestos Containing Materials Location Drawings

HIGHVIEW ELEMENTARY SCHOOL

LOWER LEVEL



Location of Assumed Asbestos Containing Electrical Wire Insulation

Appendix D
Lead XRF Results

Client: Greenburgh Central School District	Date: January 12, 2022
Project: Highview Elementary School	Job #: 21819
Inspector Name: Drew Cheskin	Signature: <i>Drew Cheskin</i>
	XRF Serial Number: 26952

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
939	-	-	-	Calibration Check	1.00	-
940	-	-	-	Calibration Check	1.10	-
941	-	-	-	Calibration Check	1.10	-
942	Metal	Fan Unit	Gray	Lower Level - Fan Room	0.02	Negative
943	Metal	I-Beam	Red	Lower Level - Fan Room	0.01	Negative
944	Metal	Ceiling Joist	Black	Lower Level - Fan Room	0.00	Negative
945	Metal	Spare Ducting	Gray	Lower Level - Fan Room	0.11	Negative
946	Metal	Fan Unit	Light Gray	Lower Level - Fan Room	0.05	Negative
947	Metal	Drain Pipe	Black	Lower Level - Fan Room	0.00	Negative
948	Metal	Door	Tan	Lower Level - Fan Room	0.00	Negative
949	Metal	Door Frame	Tan	Lower Level - Fan Room	0.00	Negative
950	Metal	Door	Aqua	Lower Level - Lobby (to Gymnasium)	0.00	Negative
951	Metal	Door	Black	Lower Level - Lobby (to Gymnasium)	0.00	Negative
952	Metal	Door Frame	Green	Lower Level - Lobby (to Gymnasium)	2.50	Positive
953	Metal	Glass Partition	Green	Lower Level - Lobby (to Gymnasium)	2.30	Positive

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
954	Metal	I-Beam	Green	Lower Level - Lobby (to Gymnasium)	1.30	Positive
955	CMU	Wall	Cream	Lower Level - Lobby (to Gymnasium)	0.00	Negative
956	Block	Wall	Green	Lower Level - Lobby (to Gymnasium)	0.00	Negative
957	Metal	Door	Red	Lower Level - Gymnasium	0.00	Negative
958	Metal	Door	Black	Lower Level - Gymnasium	0.00	Negative
959	Metal	Door Frame	White	Lower Level - Gymnasium	2.00	Positive
960	Metal	Glass Partition	White	Lower Level - Gymnasium	0.03	Negative
961	Metal	Glass Partition	White	Lower Level - Gymnasium	0.04	Negative
962	Metal	Door Frame	White	Lower Level - Gymnasium	0.00	Negative
963	Metal	I-Beam	Black	Lower Level - Gymnasium	0.14	Negative
964	CMU	Wall	Cream	Lower Level - Gymnasium	0.00	Negative
965	Metal	Door	Gray	Elevator	0.00	Negative
966	Metal	Door Frame	Gray	Elevator	0.00	Negative
967	Metal	Interior	Light Gray	Elevator	0.00	Negative
968	Metal	Ceiling	White	Elevator	0.00	Negative
969	CMU	Wall	Cream	Elevator	0.00	Negative
970	Block	Wall	Green	Elevator	0.00	Negative
971	Metal	Glass Partition	White	Upper Level - Corridor	-0.05	Negative
972	Metal	I-Beam	White	Upper Level - Corridor	5.40	Positive
973	CMU	Wall	Yellow	Upper Level - Corridor	0.00	Negative
974	Metal	Glass Partition	White	Upper Level - Corridor	0.02	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
975	Metal	I-Beam	White	Upper Level - Corridor	0.40	Negative
976	CMU	Wall	Yellow	Upper Level - Corridor	0.00	Negative
977	-	-	-	Calibration Check	1.10	-
978	-	-	-	Calibration Check	0.90	-
979	-	-	-	Calibration Check	1.10	-

Appendix E

Photo Log



Non-asbestos containing CMU Mortar, Gray & 2'x2' Ceiling Tiles (all types), White.

Appendix F

Certifications

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Enviroscience Consultants, LLC
2150 Smithtown Avenue
Ronkonkoma, NY 11779

FILE NUMBER: 99-0882
LICENSE NUMBER: 28733
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 11/15/2021
EXPIRATION DATE: 11/30/2022

Duly Authorized Representative – Glenn Neuschwender:

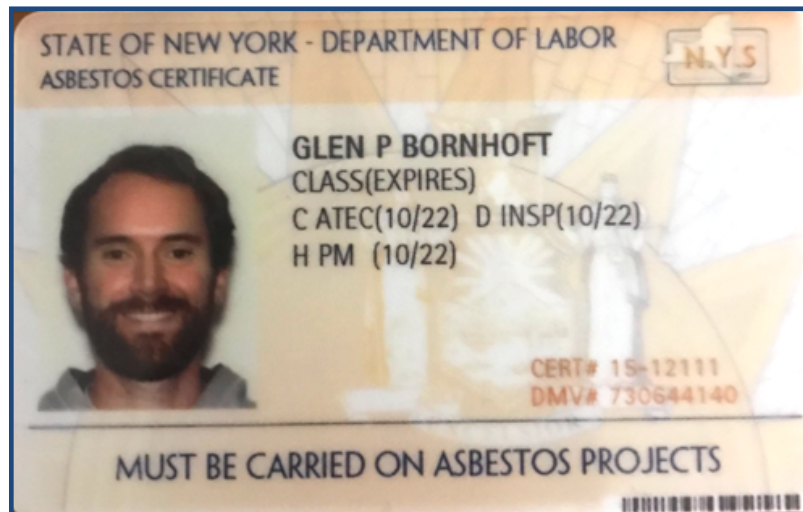
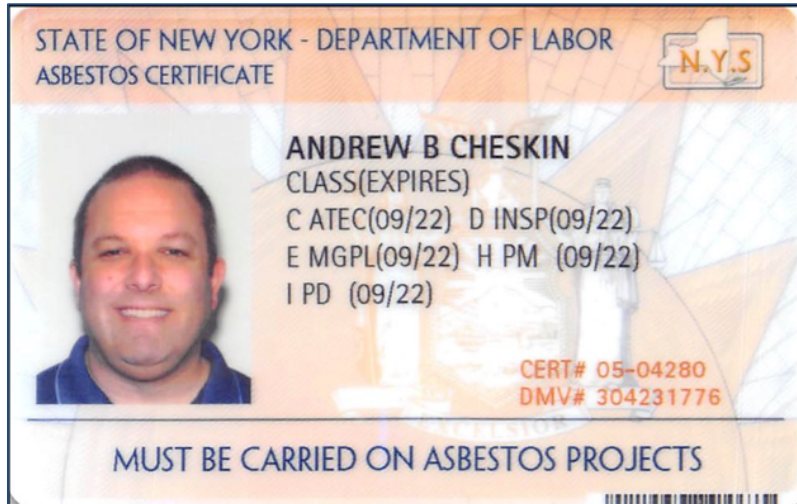
This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with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

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



Amy Phillips, Director
For the Commissioner of Labor

SH 432 (8/12)



United States Environmental Protection Agency

This is to certify that

Enviroscience Consultants, Inc.

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

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires May 28, 2022

LBP-1327-1

Certification #

January 29, 2019

Issued On



Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that

Andrew B Cheskin

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

Risk Assessor

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires August 06, 2024

LBP-R-11931-2

Certification #

August 02, 2021

Issued On



Ben Conetta, Chief

Chemicals and Multimedia Programs Branch

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2022
Issued April 01, 2021
Revised October 19, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. GLENN L. NEUSCHWENDER
ENVIROSCIENCE CONSULTANTS, LLC
2150 SMITHTOWN AVENUE SUITE 3
RONKONKOMA, NY 11779

NY Lab Id No: 11681

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

Miscellaneous

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



Serial No.: 63960

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

Page 1 of 1

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Enviroscience Consultants, LLC

2150 Smithtown Ave.

Suite 3

Ronkonkoma, NY 11779

Mr. Edward Detweiler

Phone: 631-580-3191 Fax: 631-580-3195

Email: edetweiler@envirohealth.org

<http://www.envirohealth.org>

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 200531-0

Bulk Asbestos Analysis

Code

Description

18/A01

EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

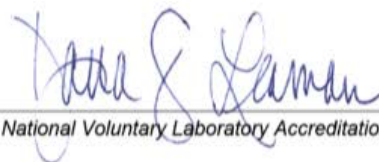
Airborne Asbestos Analysis

Code

Description

18/A02

U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



For the National Voluntary Laboratory Accreditation Program

Effective 2021-10-01 through 2022-09-30

Page 1 of 1

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200531-0

Enviroscience Consultants, LLC
Ronkonkoma, NY

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2021-10-18 through 2022-09-30
Effective Dates



[Signature]
For the National Voluntary Laboratory Accreditation Program

Limited Environmental Survey

Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530

Lee F. Jackson Elementary School
2 Saratoga Road
White Plains, NY 10607

March 2022



2150 Smithtown Ave., Suite 3, Ronkonkoma, NY 11779

T: 631.580.3191 • F: 631.580.3195 • W: envirohealth.org

ASBESTOS & LEAD SURVEY REPORT

Lee F. Jackson Elementary School

2 Saratoga Road

White Plains, NY 10607

March 2022

Enviroscience Project No. 21819

Prepared for: Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530

Prepared by: ENVIROSCIENCE CONSULTANTS, LLC.
2150 Smithtown Avenue
Ronkonkoma, NY 11779
(631) 580-3191

37 Moore Avenue
Mount Kisco, NY 10549
(914) 864-1699

Asbestos / Lead Inspector: Drew Cheskin
Drew Cheskin
NYS Asbestos Certificate: 05-04280
NYS/EPA Lead Risk Assessor: LBP-R-11931-1

Asbestos / Lead Inspector: Glen Bornhoft
Glen Bornhoft
NYS Asbestos Certificate: 15-12111

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>
1.0	Executive Summary
2.0	Asbestos Survey
2.1	Asbestos Survey Procedures
2.2	Asbestos Sampling Procedures
3.0	Lead-based Paint Inspection
3.1	Lead Inspection Procedures
3.2	Lead Sampling Results

Appendices

Appendix A	Asbestos Bulk Sample Results
Appendix B	Asbestos Bulk Sample Location Drawings
Appendix C	Asbestos Containing Materials Location Drawings
Appendix D	Lead XRF Results
Appendix E	Photo Log
Appendix F	Certifications

1.0 EXECUTIVE SUMMARY

Greenburgh Central School District retained Enviroscience Consultants, LLC. to conduct a limited asbestos & lead survey at Lee F Jackson Elementary School, 2 Saratoga Road, White Plains, New York. The purpose of this survey was to identify and quantify asbestos containing materials (ACM) & Lead-based paint (LBP) that may be affected by proposed renovations within the building.

The survey was performed on January 13th, 2022, and based upon written and verbal communications with Jim Weydig of BBS Architects (BBS). Floor plans with highlighted areas were provided, but no architectural, renovation, demolition or proposed construction plans were provided, and no comprehensive written scope of work was available at the time of the survey. As a result, the survey consisted of inspecting the highlighted areas of the provided floor plans, and with the guidance from BBS, sampling or testing accessible materials for asbestos or lead content. No destructive or invasive measures were used to identify or sample materials, and live electrical and operating mechanical systems were not accessed for inspection. Upon receipt of finalized architectural drawings, additional sampling may be required.

Asbestos

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials **contain asbestos** (greater than 1-percent);

- **Elbows to Original Fiberglass Pipe Insulation, White**
- **Rope Insulation to Duct Hatch, White**
- **Mastic to Fiberglass Duct Insulation Clamps, Brown**

The following materials were not sampled, but are **presumed to contain asbestos** (greater than 1-percent) based on historical testing of similar materials;

- None

For each survey conducted, the inspector classifies ACM or Assumed ACM materials by friability and condition. This helps to determine the extent of damage in certain areas as well as the potential for further damage and Asbestos release due to disturbance of the material.

Material Location	Material	Quantity*	Friability	Condition
Boiler Room	Elbows to Original Fiberglass Pipe Insulation, White	3 elbows**	Yes	Fair
Boiler Room	Rope Insulation to Duct Hatch, White	10 LF***	Yes	Good
Boiler Room	Mastic to Fiberglass Duct Insulation Clamps, Brown	300 SF	No	Good

* All quantities in this assessment are estimations. An abatement contractor should perform a site walk through and calculate quantities prior to submitting a proposal.

** Represents only visible elbows. More elbows are presumed to exist within the ceiling plenum.

*** Only one access hatch with this material was identified. More may exist in inaccessible areas of mechanical equipment

Condition Definitions:

Good: None/Minimal apparent damage to ACM

Fair: Up to 10% localized damage or up to 25% of the entire ACM is damaged

Poor: Over 10% localized damage or over 25% of the entire ACM is damaged

Asbestos-containing materials (ACM) may only be removed or disturbed by a certified and licensed asbestos abatement contractor. Project monitoring for asbestos abatement projects by an independent air-monitoring firm under contract of the Owner is required, with air sampling being required for most projects. All other materials tested negative for asbestos.

Lead

An EPA certified lead risk assessor used an X-ray Fluorescence (XRF) analyzer to inspect the building in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision. OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount.

The following surfaces were identified with lead levels above the HUD Guideline definition of greater than 1.0 milligram per square centimeter (mg/cm²):

- None

A full list of components sampled as part of the Lead-based Paint Survey is included in Section 3.0.

2.0 ASBESTOS SURVEY

2.1 Asbestos Survey Procedures

The asbestos survey was designed to meet all requirements specified in the *NYS Asbestos Code Rule, 12 NYCRR Part 56, Subpart 56-5.1 Asbestos Survey Requirements for Building/Structure Demolition, Renovation, Remodeling and Repair*. The asbestos survey was conducted by New York State certified asbestos inspectors. Sample analysis was performed by Enviroscience Consultants, LLC., a New York State Department of Health Environmental Laboratory Approval Program accredited laboratory.

New York State requires that the asbestos survey information be transmitted by the building owner as follows:

- One copy of the completed asbestos survey shall be sent by the owner or their agent to the local government entity charged with issuing a permit for such demolition, renovation, remodeling or repair work under applicable State or local laws.
- The completed asbestos survey for controlled demolition or pre-demolition asbestos projects shall also be submitted to the appropriate Asbestos Control Bureau district office.
- The completed asbestos survey shall be kept on the construction site with the asbestos notification and variance, if required, throughout the duration of the asbestos project and any associated demolition, renovation, remodeling or repair project.

Enviroscience performed a site investigation of target areas within the building that included a visual inspection of all accessible areas designated for renovation. Material systems were assigned into groups of homogeneous materials. A homogeneous material is defined as a material that is alike in color and texture that was installed at the same time. Samples were then collected from each homogeneous area according to USEPA AHERA requirements. Based upon sample results, each sampled homogeneous area was classified as either asbestos or non-asbestos containing. An asbestos containing material is defined by the USEPA as a material containing greater than one percent asbestos by weight.

New York State certified Asbestos Inspector Drew Cheskin (cert. #05-04280) and New York State certified Asbestos Inspector Glen Bornhoft (cert. #15-12111) conducted the survey on January 13th, 2022. Certifications are provided in Appendix F. The inspectors entered all accessible areas to identify and sample suspect asbestos containing materials. Please reference Asbestos Bulk Sample Location Drawings in Appendix B. Asbestos-containing materials (ACM) are noted above in the Executive Summary and in this section. Also reference the Asbestos Bulk Sample Results in Appendix A and Asbestos Containing Materials Location Drawings in Appendix C.

Photographs in Appendix E are typical and do not show all of the asbestos materials that they represent.

Any asbestos containing materials that will be disturbed during renovation or demolition must be removed by a New York State certified and licensed asbestos abatement contractor. Air monitoring is required for most asbestos projects.

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials are **classified as non-asbestos containing** (less than or equal to 1-percent) and may be removed or disturbed as regular construction materials:

- Ceiling Plaster, scratch coat, Gray (no finish coat present)
- Canvas to Original Fiberglass Pipe Insulation, Brown
- Canvas to Fiberglass Water Tank Insulation, White
- CMU Mortar, Gray
- Caulk on Ductwork, Gray
- Furnace Interior Rope Gasket, Beige
- Furnace Interior Caulk, Red

Refer to the Bulk Sample Results #32070 for detailed sample information.

The following materials are **classified as non-suspect** (not considered suspect asbestos containing materials by EPA or NYS DOL) and may be removed or disturbed as regular construction materials:

- Brick
- CMU
- Concrete

- Fiberglass Pipe Insulation w/Hard Fiberglass Elbows
- Rubber/Vinyl Wire Insulation
- Stone

The following **locations were not inspected** due to inaccessibility, the destructive nature of the testing and inability to repair the building component, live electrical or active mechanical components, or by directive of the client. Should work in these areas reveal previously unsampled suspect asbestos containing materials, these materials must be **assumed asbestos containing** and all activities in the area(s) must stop immediately until proper sample collection and laboratory analysis has been performed:

- No exterior materials were sampled
- No penetrations into exterior walls were made
- Plenum above plaster ceiling
- Interior of air handlers/duct work systems
- Interior of furnaces

2.2 Asbestos Sampling Procedures

Samples of suspect asbestos materials were collected in accordance with United States Environmental Protection Agency guidelines as outlined below. These sampling procedures were implemented in an effort to minimize the release of asbestos fibers during sampling and to provide control of samples through analysis and reporting.

- Samples were collected in unoccupied areas.
- Surfaces of the material to be sampled were wetted with water mist prior to collection.
- Samples were collected with a cork borer, knife, or other approved sampling tool.
- Sampling tools were decontaminated between each sample.
- Individual sealable containers were used to contain each of the collected samples.
- Samples were double-bagged for transportation to the laboratory.
- Sample containers were labeled with a date and unique sample ID number using a permanent marker.

At the completion of sampling activities, bulk samples were relinquished to the laboratory for analysis. Enviroscience Consultants, LLC. is a New York State Department of Health (NYSDOH)

Environmental Laboratory Approval Program accredited environmental testing laboratory (ELAP #11681). The laboratory is also accredited by the National Voluntary Laboratory Accreditation Program, (NVLAP Lab Code 200531-0).

All asbestos bulk samples were analyzed by Polarized Light Microscopy (PLM). Samples of cellulose ceiling tiles, and non-friable organically bound (NOB) materials such as floor tiles and roofing material, that were found to contain less than 1% asbestos by PLM were then analyzed using Transmission Electron Microscopy (TEM). According to the Department of Health, NOB materials may first be analyzed by PLM. If asbestos is not found using PLM, the sample must be analyzed with the higher-powered transmission electron microscope.

3.0 LEAD-BASED PAINT INSPECTION

3.1 Lead Inspection Procedures

Enviroscience Consultants, LLC. conducted a limited Lead-based Paint Inspection throughout select interior locations of Lee F. Jackson Elementary School. The purpose of the limited Lead-based Paint Inspection was to identify surfaces and building components which may be coated with lead-based paint. An EPA certified lead inspector/risk assessor used an X-ray Fluorescence (XRF) analyzer to test building components in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision.

3.2 Lead Sampling Results

Tested components and surfaces include:

- Metal, Door, Light Gray, Boiler Room
- Metal, Door Frame, Dark Gray, Boiler Room
- Metal, Stair Railing, Black, Boiler Room
- Wood, Wall Panel, Black, Boiler Room
- Concrete, Wall (A), Light Gray, Boiler Room
- Metal, Conduit, Light Gray, Boiler Room
- Metal, Wire Chase, Light Gray, Boiler Room
- Concrete, Floor, Light Gray, Boiler Room
- Plaster, Ceiling, Dark Gray, Boiler Room
- Metal, Duct Work, Dark Gray, Boiler Room

- Metal, Gas Pipe, Black, Boiler Room
- Metal, Gas Pipe, Yellow, Boiler Room
- Metal, Furnace, Blue, Boiler Room
- Metal, Compressor Tanks, Red, Boiler Room
- Metal, Compressor Motor, Blue, Boiler Room
- Metal, Stair Stringer, Black, Boiler Room
- Metal, Wall Panel, Light Gray, Boiler Room

Lead amounts greater than or equal to 1.0 mg/cm² have been identified in the components listed below:

- None

All other surfaces and components tested for lead-based paint were below 1.0 mg/cm². All workers involved in construction and demolition activities are covered under The OSHA Lead Exposure in Construction Rule (29 CFR 1926.62). OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount. This standard requires workers to be trained and protected from lead exposure by use of engineering controls, respiratory protection, protective clothing and medical surveillance when airborne concentration of lead exceed established personal exposure limit (PEL) levels.

Complete Lead XRF Results are located in Appendix D.

Please reference Enviroscience Consultants, LLC. certifications in Appendix F.

Appendix A
Asbestos Bulk Sample Results

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/13/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/18/2022
JOB #:	21819	AREA:	Lee F. Jackson ES
PAGE #:	1 of 4	SAMPLER:	Drew Cheskin
		CUSTODY #:	32070

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
01-01	Ceiling Plaster, scratch coat	Gray	Boiler Room	None Detected		5.0% cellulose	15.0% perlite 80.0% plaster
01-02	Ceiling Plaster, scratch coat	Gray	Boiler Room	None Detected		5.0% cellulose	15.0% perlite 80.0% plaster
01-03	Ceiling Plaster, scratch coat	Gray	Boiler Room	None Detected		5.0% cellulose	15.0% perlite 80.0% plaster
01-04	Ceiling Plaster, scratch coat	Gray	Boiler Room	None Detected		5.0% cellulose	15.0% perlite 80.0% plaster
01-05	Ceiling Plaster, scratch coat	Gray	Boiler Room	None Detected		5.0% cellulose	15.0% perlite 80.0% plaster
02-06	Canvas to Original Fiberglass Pipe Insulation	Brown	Boiler Room	None Detected		95.0% cellulose	5.0% binders
02-07	Canvas to Original Fiberglass Pipe Insulation	Brown	Boiler Room	None Detected		90.0% cellulose	10.0% binders

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

This report may not be reproduced without the express permission of EnviroScience. This report cannot be used to claim endorsement of products by NVLAP or any agency of the U.S. Government. Test results only reflect conditions at the time the samples were taken.

Analyzed by:



Date Analyzed:

1/24/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/13/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/18/2022
JOB #:	21819	AREA:	Lee F. Jackson ES
PAGE #:	2 of 4	SAMPLER:	Drew Cheskin
		CUSTODY #:	32070

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
02-08	Canvas to Original Fiberglass Pipe Insulation	Brown	Boiler Room	None Detected		90.0% cellulose	10.0% binders
03-09	Elbows to Original Fiberglass Pipe Insulation	White	Boiler Room	66.7% Asbestos	66.7% Chrysotile	16.7% cellulose	16.6% binders
03-10	Elbows to Original Fiberglass Pipe Insulation	White	Boiler Room	66.7% Asbestos	66.7% Chrysotile	16.7% cellulose	16.6% binders
03-11	Elbows to Original Fiberglass Pipe Insulation	White	Boiler Room	66.7% Asbestos	66.7% Chrysotile	16.7% cellulose	16.6% binders
04-12	Canvas to Water Tank Insulation	White	Boiler Room	None Detected		65.0% fiberglass 20.0% cellulose	15.0% binders
04-13	Canvas to Water Tank Insulation	White	Boiler Room	None Detected		70.0% fiberglass 20.0% cellulose	10.0% binders
04-14	Canvas to Water Tank Insulation	White	Boiler Room	None Detected		70.0% fiberglass 20.0% cellulose	10.0% binders

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by:



Date Analyzed:

1/24/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/13/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/18/2022
JOB #:	21819	AREA:	Lee F. Jackson ES
PAGE #:	3 of 4	SAMPLER:	Drew Cheskin
		CUSTODY #:	32070

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
05-15	CMU Mortar	Gray	Boiler Room	None Detected		3.0% cellulose	97.0% cement
05-16	CMU Mortar	Gray	Boiler Room	None Detected		3.0% cellulose	97.0% cement
06-17	Rope Insulation to Duct Hatch	White	Boiler Room	50.0% Asbestos	50.0% Chrysotile	37.5% cellulose	12.5% binders
06-18	Rope Insulation to Duct Hatch	White	Boiler Room	50.0% Asbestos	50.0% Chrysotile	37.5% cellulose	12.5% binders
07-19	Caulk on Ductwork	Gray	Boiler Room	None Detected by TEM		None Detected	73.6% organics and carbonates 26.4% silicates and opaques
07-20	Caulk on Ductwork	Gray	Boiler Room	None Detected by TEM		None Detected	72.9% organics and carbonates 27.1% silicates and opaques
08-21	Mastic to Fiberglass Duct Insulation Clamps	Brown	Boiler Room	5.3% Asbestos	5.3% Chrysotile	None Detected	77.6% organics and carbonates 17.1% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by:



Date Analyzed:

1/24/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/13/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/18/2022
JOB #:	21819	AREA:	Lee F. Jackson ES
PAGE #:	4 of 4	SAMPLER:	Drew Cheskin
		CUSTODY #:	32070

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
08-22	Mastic to Fiberglass Duct Insulation Clamps	Brown	Boiler Room	None Detected by TEM		None Detected	78.1% organics and carbonates 21.9% silicates and opaques
09-23	Furnace Interior Rope Gasket	Beige	Boiler Room	None Detected		80.0% fiberglass 10.0% cellulose	10.0% binders
09-24	Furnace Interior Rope Gasket	Beige	Boiler Room	None Detected		80.0% fiberglass 10.0% cellulose	10.0% binders
10-25	Furnace Interior Caulk	Red	Boiler Room	None Detected by TEM		None Detected	73.3% organics and carbonates 26.7% silicates and opaques
10-26	Furnace Interior Caulk	Red	Boiler Room	None Detected by TEM		None Detected	57.2% organics and carbonates 42.8% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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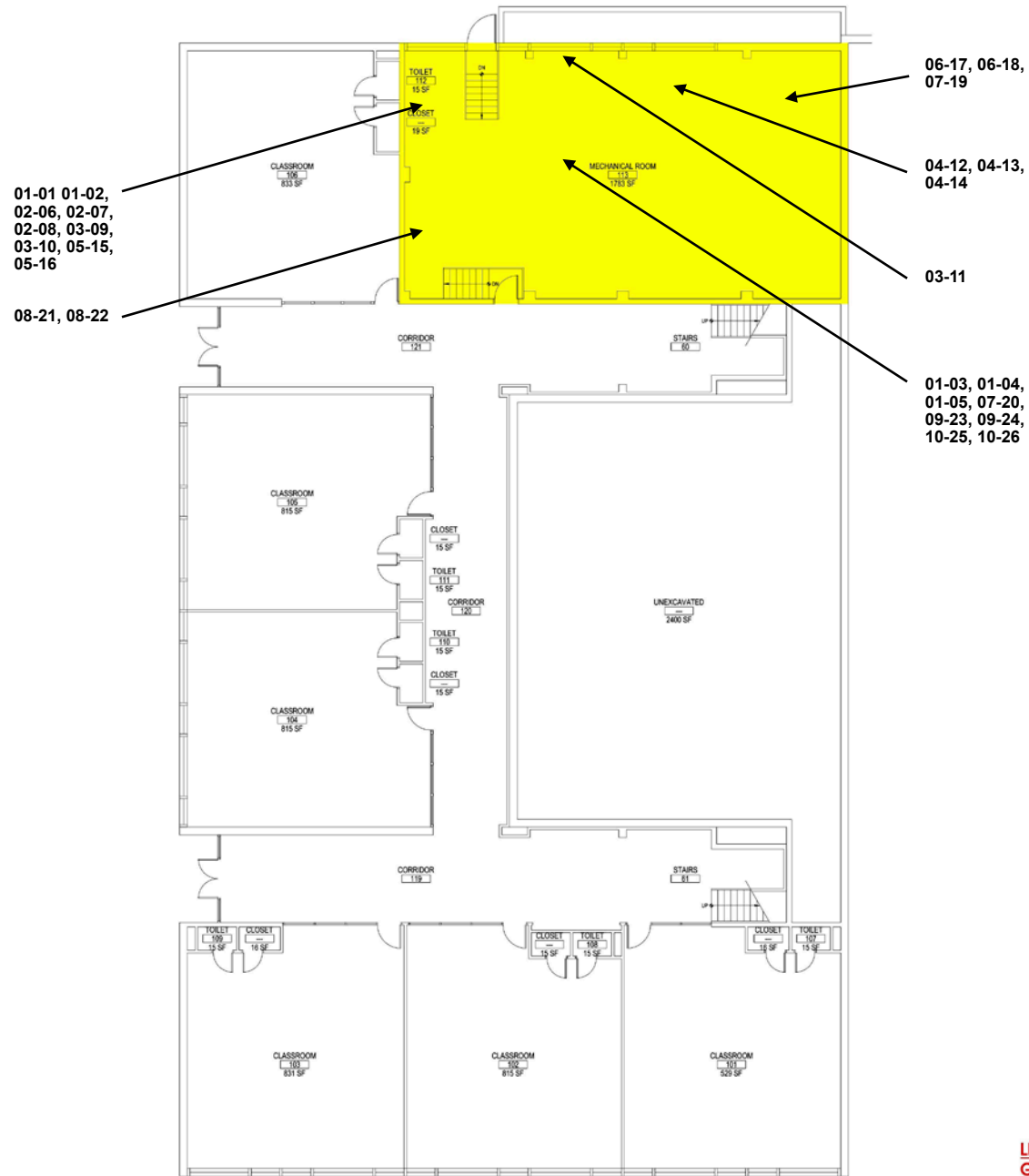
Analyzed by:



Date Analyzed:

1/24/2022

Appendix B
Asbestos Bulk Sample Location Drawings



**LEE F. JACKSON ELEMENTARY SCHOOL
GROUND FLOOR**



ENVIROSCIENCE
CONSULTANTS, INC
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN
NO SCALE

PROJECT

**DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS**

CLIENT

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

COMMENTS:

LEE F. JACKSON ES

FIRST FLOOR

BULK SAMPLE LOCATION PLAN

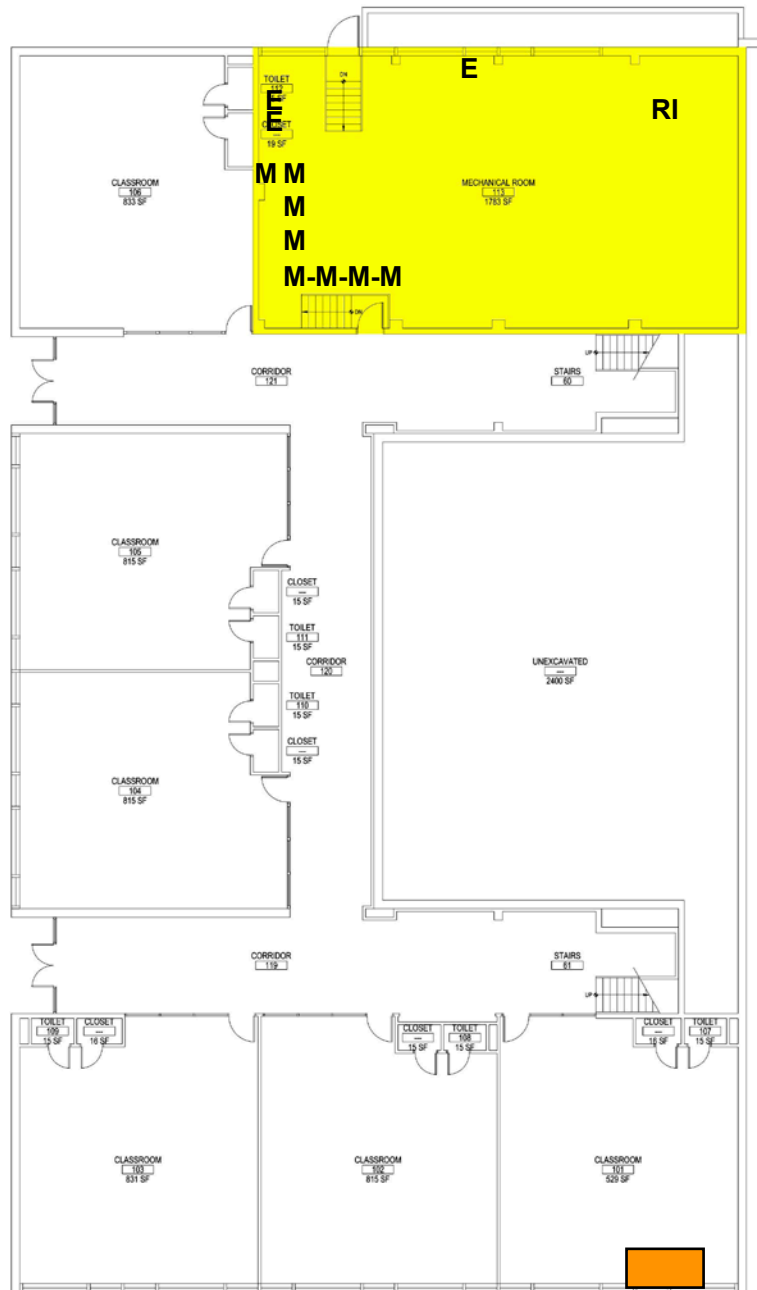
NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 1 of 1

Appendix C
Asbestos Containing Materials Location Drawings



- E** Location of Asbestos Containing Elbows to Original Fiberglass Pipe Insulation (more assumed to exist above non-asbestos containing plaster ceiling)
- RI** Location of Asbestos Containing Rope Insulation to Duct Hatch
- M** Location of Asbestos Containing Mastic to Fiberglass Duct Insulation Clamps

**LEE F. JACKSON ELEMENTARY SCHOOL
GROUND FLOOR**



ENVIROSCIENCE
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www.envirohealth.org

KEY PLAN
NO SCALE

PROJECT

**DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS**

CLIENT

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

COMMENTS:

LEE F. JACKSON ES

FIRST FLOOR

ASBESTOS CONTAINING MATERIALS

LOCATION PLAN

NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 1 of 1

Appendix D
Lead XRF Results

Client: Greenburgh Central School District			Date: January 13, 2022		
Project: Lee F. Jackson Elementary School			Job #: 21819		
Inspector Name: Drew Cheskin		Signature: <i>Drew Cheskin</i>		XRF Serial Number: 26952	

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
981	-	-	-	Calibration Check	1.10	-
982	-	-	-	Calibration Check	1.10	-
983	-	-	-	Calibration Check	1.00	-
984	Metal	Door	Light Gray	Boiler Room	0.00	Negative
985	Metal	Door Frame	Dark Gray	Boiler Room	0.02	Negative
986	Metal	Stair Railing	Black	Boiler Room	0.05	Negative
987	Wood	Wall Panel	Black	Boiler Room	0.00	Negative
988	Concrete	Wall (A)	Light Gray	Boiler Room	0.10	Negative
989	Metal	Conduit	Light Gray	Boiler Room	0.06	Negative
990	Metal	Wire Chase	Light Gray	Boiler Room	0.03	Negative
991	Concrete	Floor	Light Gray	Boiler Room	0.10	Negative
992	Plaster	Ceiling	Dark Gray	Boiler Room	0.00	Negative
993	Metal	Duct Work	Dark Gray	Boiler Room	0.11	Negative
994	Metal	Gas Pipe	Black	Boiler Room	0.00	Negative
995	Metal	Gas Pipe	Yellow	Boiler Room	0.00	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
996	Metal	Furnace	Blue	Boiler Room	0.00	Negative
997	Metal	Compressor Tanks	Red	Boiler Room	0.01	Negative
998	Metal	Compressor Motor	Blue	Boiler Room	0.07	Negative
999	Metal	Stair Stringer	Black	Boiler Room	0.18	Negative
1000	Metal	Wall Panel	Light Gray	Boiler Room	0.00	Negative
1001	-	-	-	Calibration Check	1.10	-
1002	-	-	-	Calibration Check	1.00	-
1003	-	-	-	Calibration Check	1.10	-

Appendix E

Photo Log



Asbestos containing Elbows to Original Fiberglass Pipe Insulation, White



Asbestos containing Elbows to Original Fiberglass Pipe Insulation, White



Asbestos containing Rope Insulation to Duct Hatch, White



Asbestos containing Mastic to Fiberglass Duct Insulation Clamps, Brown



Asbestos containing Mastic to Fiberglass Duct Insulation Clamps, Brown

Appendix F

Certifications

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Enviroscience Consultants, LLC
2150 Smithtown Avenue
Ronkonkoma, NY 11779

FILE NUMBER: 99-0882
LICENSE NUMBER: 28733
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 11/15/2021
EXPIRATION DATE: 11/30/2022

Duly Authorized Representative – Glenn Neuschwender:

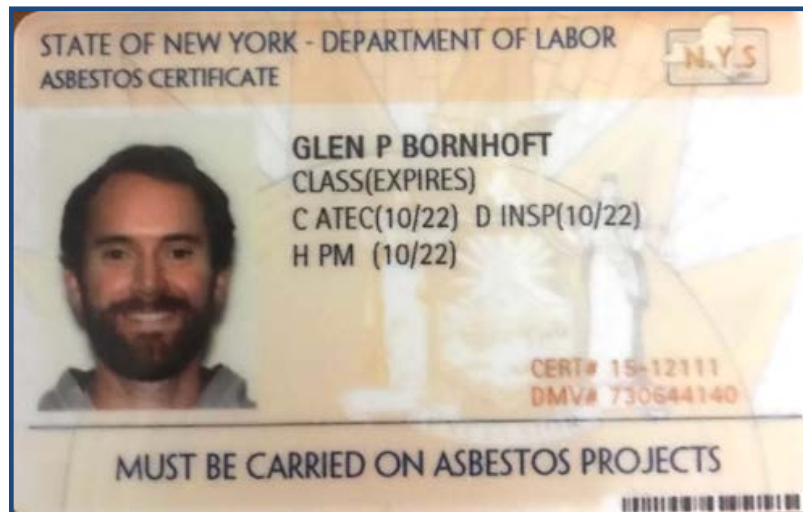
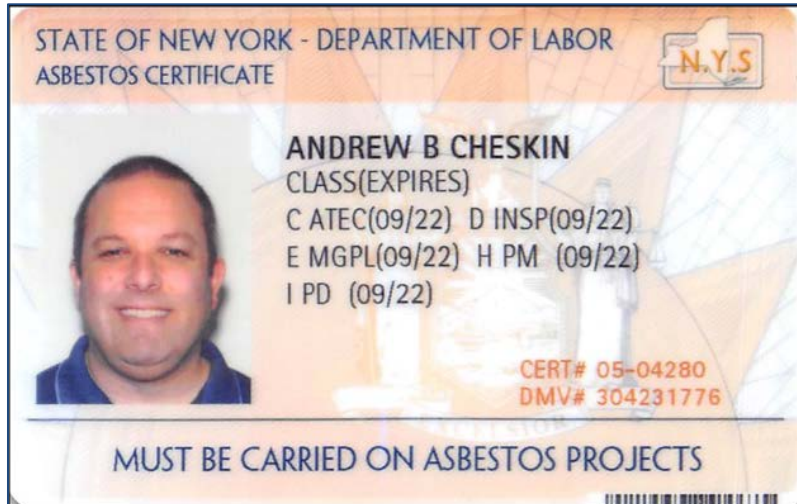
This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with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

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



Amy Phillips, Director
For the Commissioner of Labor

SH 432 (8/12)



United States Environmental Protection Agency

This is to certify that

Enviroscience Consultants, Inc.

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

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires May 28, 2022

LBP-1327-1

Certification #

January 29, 2019

Issued On



A handwritten signature in black ink, appearing to read "Michelle Price".

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that

Andrew B Cheskin

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

Risk Assessor

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires August 06, 2024

LBP-R-11931-2

Certification #

August 02, 2021

Issued On



A handwritten signature in black ink, appearing to read "Ben Conetta".

Ben Conetta, Chief

Chemicals and Multimedia Programs Branch

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2022
Issued April 01, 2021
Revised October 19, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. GLENN L. NEUSCHWENDER
ENVIROSCIENCE CONSULTANTS, LLC
2150 SMITHTOWN AVENUE SUITE 3
RONKONKOMA, NY 11779

NY Lab Id No: 11681

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

Miscellaneous

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



Serial No.: 63960

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

Page 1 of 1

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Enviroscience Consultants, LLC

2150 Smithtown Ave.

Suite 3

Ronkonkoma, NY 11779

Mr. Edward Detweiler

Phone: 631-580-3191 Fax: 631-580-3195

Email: edetweiler@envirohealth.org

<http://www.envirohealth.org>

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 200531-0

Bulk Asbestos Analysis

Code

Description

18/A01

EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code

Description

18/A02

U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



For the National Voluntary Laboratory Accreditation Program

Effective 2021-10-01 through 2022-09-30

Page 1 of 1

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200531-0

Enviroscience Consultants, LLC
Ronkonkoma, NY

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2021-10-18 through 2022-09-30
Effective Dates



[Signature]
For the National Voluntary Laboratory Accreditation Program

Limited Environmental Survey

**Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530**

**Richard J. Bailey Elementary School
33 West Hillside Avenue
White Plains, NY 10607**

March 2022



2150 Smithtown Ave., Suite 3, Ronkonkoma, NY 11779

T: 631.580.3191 • **F:** 631.580.3195 • **W:** envirohealth.org

ASBESTOS & LEAD SURVEY REPORT

Richard J. Bailey Elementary School

33 West Hillside Avenue

White Plains, NY 10607

March 2022

Enviroscience Project No. 21819

Prepared for: Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530

Prepared by: ENVIROSCIENCE CONSULTANTS, LLC.
2150 Smithtown Avenue
Ronkonkoma, NY 11779
(631) 580-3191

37 Moore Avenue
Mount Kisco, NY 10549
(914) 864-1699

Asbestos / Lead Inspector: Drew Cheskin
Drew Cheskin
NYS Asbestos Certificate: 05-04280
NYS/EPA Lead Risk Assessor: LBP-R-11931-1

Asbestos / Lead Inspector: Glen Bornhoft
Glen Bornhoft
NYS Asbestos Certificate: 15-12111

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>
1.0	Executive Summary
2.0	Asbestos Survey
2.1	Asbestos Survey Procedures
2.2	Asbestos Sampling Procedures
3.0	Lead-based Paint Inspection
3.1	Lead Inspection Procedures
3.2	Lead Sampling Results

Appendices

Appendix A	Asbestos Bulk Sample Results
Appendix B	Asbestos Bulk Sample Location Drawings
Appendix C	Asbestos Containing Materials Location Drawings
Appendix D	Lead XRF Results
Appendix E	Photo Log
Appendix F	Certifications

1.0 EXECUTIVE SUMMARY

Greenburgh Central School District retained Enviroscience Consultants, LLC. to conduct a limited asbestos & lead survey at Richard J. Bailey Elementary School, 33 West Hillside Avenue, White Plains, New York. The purpose of this survey was to identify and quantify asbestos containing materials (ACM) & Lead-based paint (LBP) that may be affected by proposed renovations within the building.

The survey was performed on February 2nd, 9th, 15th & 17th, 2022, and based upon written and verbal communications with Jim Weydig of BBS Architects (BBS). Floor plans with highlighted areas were provided, but no architectural, renovation, demolition or proposed construction plans were provided, and no comprehensive written scope of work was available at the time of the survey. As a result, the survey consisted of inspecting the highlighted areas of the provided floor plans, and with the guidance from BBS, sampling or testing accessible materials for asbestos or lead content. Limited destructive and invasive measures were used to identify or sample materials, and live electrical and operating mechanical systems were not accessed for inspection. Upon receipt of finalized architectural drawings, additional sampling may be required.

Asbestos

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials **contain asbestos** (greater than 1-percent);

- 12"x12" Floor Tile, Blue (Room 202)
- 12"x12" Floor Tile, Red (Room 202)

The following materials were not sampled, but are **presumed to contain asbestos** (greater than 1-percent) based on historical testing of similar materials;

- Pipe Insulation & Associated Elbows (Throughout – not to be affected by current SOW)

For each survey conducted, the inspector classifies ACM or Assumed ACM materials by friability and condition. This helps to determine the extent of damage in certain areas as well as the potential for further damage and Asbestos release due to disturbance of the material.

Material Location	Material	Quantity*	Friability	Condition
Classroom 202	12"x12" Floor Tile, Blue	625 SF	No	Good
	12"x12" Floor Tile, Red		No	Good

*** All quantities in this assessment are estimations. An abatement contractor should perform a site walk through and calculate quantities prior to submitting a proposal.**

Condition Definitions:

Good: None/Minimal apparent damage to ACM

Fair: Up to 10% localized damage or up to 25% of the entire ACM is damaged

Poor: Over 10% localized damage or over 25% of the entire ACM is damaged

Asbestos-containing materials (ACM) may only be removed or disturbed by a certified and licensed asbestos abatement contractor. Project monitoring for asbestos abatement projects by an independent air-monitoring firm under contract of the Owner is required, with air sampling being required for most projects. All other materials tested negative for asbestos.

Lead

An EPA certified lead risk assessor used an X-ray Fluorescence (XRF) analyzer to inspect the building in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision. OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount.

The following surfaces were identified with lead levels above the HUD Guideline definition of greater than 1.0 milligram per square centimeter (mg/cm²):

- **Plaster, Wall (C), Cream, Room 002**
- **Metal, Unit Ventilator, Cream, Room 004**
- **Metal, Unit Ventilator, Aqua, Room 006**
- **Plaster, Wall (C), Aqua, Room 006**
- **Metal, Radiator, White, Room 006**
- **Plaster, Wall (C), Aqua, Room 008**

- Brick, Wall (B), Gray, Art Room
- Metal, Radiator, Silver, Room 013
- Metal, Unit Ventilator, Cream, Room 114
- Metal, Radiator, Brown, Room 114
- Wood, Baseboard, Brown, Room 114
- Metal, Unit Ventilator, Cream, Room 113
- Wood, Baseboard, Brown, Room 113
- Metal, Unit Ventilator, Cream, Room 112
- Metal, Radiator, Brown, Room 112
- Wood, Baseboard, Brown, Room 112
- Metal, Unit Ventilator, Cream, Room 108
- Metal, Radiator, Brown, Room 108
- Wood, Baseboard, Brown, Room 108
- Metal, Unit Ventilator, Cream, Room 106
- Plaster, Wall (C), Cream, Room 106
- Metal, Radiator, Cream, Room 106
- Wood, Baseboard, Brown, Room 106
- Metal, Radiator, Brown, Room 104
- Metal, Radiator, Brown, Room 102
- Metal, Radiator, Brown, Room 103
- Metal, Radiator, Yellow, Room 100
- Metal, Radiator, Brown, Room 101
- Metal, Radiator, Brown, Room 202
- Plaster, Wall (C), Cream, Room 204
- Wood, Baseboard, Brown, Room 204
- Plaster, Wall (C), Cream, Room 204A
- Wood, Radiator, Brown, Room 204A
- Metal, Unit Ventilator, Cream, Room 206
- Plaster, Wall (C), Cream, Room 206
- Metal, Radiator, Brown, Room 206
- Wood, Baseboard, Brown, Room 206
- Metal, Radiator, Brown, Room 208
- Metal, Unit Ventilator, Cream, Library
- Plaster, Wall (C), Cream, Library
- Metal, Radiator, Brown, Library
- Wood, Baseboard, Black, Library
- Metal, Unit Ventilator, Cream, Room 212
- Plaster, Wall (C), Cream, Room 212
- Metal, Radiator, Brown, Room 212
- Wood, Baseboard, Brown, Room 212
- Metal, Unit Ventilator, Cream, Room 213
- Plaster, Wall (C), Cream, Room 213
- Wood, Baseboard, Brown, Room 213

- Plaster, Wall (C), Cream, Room 214
- Metal, Radiator, Brown, Room 214
- Wood, Baseboard, Brown, Room 214

A full list of components sampled as part of the Lead-based Paint Survey is included in Section 3.0.

2.0 ASBESTOS SURVEY

2.1 Asbestos Survey Procedures

The asbestos survey was designed to meet all requirements specified in the *NYS Asbestos Code Rule, 12 NYCRR Part 56, Subpart 56-5.1 Asbestos Survey Requirements for Building/Structure Demolition, Renovation, Remodeling and Repair*. The asbestos survey was conducted by New York State certified asbestos inspectors. Sample analysis was performed by Enviroscience Consultants, LLC., a New York State Department of Health Environmental Laboratory Approval Program accredited laboratory.

New York State requires that the asbestos survey information be transmitted by the building owner as follows:

- One copy of the completed asbestos survey shall be sent by the owner or their agent to the local government entity charged with issuing a permit for such demolition, renovation, remodeling or repair work under applicable State or local laws.
- The completed asbestos survey for controlled demolition or pre-demolition asbestos projects shall also be submitted to the appropriate Asbestos Control Bureau district office.
- The completed asbestos survey shall be kept on the construction site with the asbestos notification and variance, if required, throughout the duration of the asbestos project and any associated demolition, renovation, remodeling or repair project.

Enviroscience performed a site investigation of target areas within the building that included a visual inspection of all accessible areas designated for renovation. Material systems were assigned into groups of homogeneous materials. A homogeneous material is defined as a

material that is alike in color and texture that was installed at the same time. Samples were then collected from each homogeneous area according to USEPA AHERA requirements. Based upon sample results, each sampled homogeneous area was classified as either asbestos or non-asbestos containing. An asbestos containing material is defined by the USEPA as a material containing greater than one percent asbestos by weight.

New York State certified Asbestos Inspector Drew Cheskin (cert. #05-04280) and New York State certified Asbestos Inspector Glen Bornhoft (cert. #15-12111) conducted the survey on February 2nd, 9th, 15th & 17th, 2022. Certifications are provided in Appendix F. The inspectors entered all accessible areas to identify and sample suspect asbestos containing materials. Please reference Asbestos Bulk Sample Location Drawings in Appendix B. Asbestos-containing materials (ACM) are noted above in the Executive Summary and in this section. Also reference the Asbestos Bulk Sample Results in Appendix A and Asbestos Containing Materials Location Drawings in Appendix C.

Photographs in Appendix E are typical and do not show all of the asbestos materials that they represent.

Any asbestos containing materials that will be disturbed during renovation or demolition must be removed by a New York State certified and licensed asbestos abatement contractor. Air monitoring is required for most asbestos projects.

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials are **classified as non-asbestos containing** (less than or equal to 1-percent) and may be removed or disturbed as regular construction materials:

- 12"x12" Floor Tile, White (Room 004)
- Mastic to 12"x12" White Floor Tile, Brown (Room 004)
- 12"x12" Floor Tile, Beige (Room 004)
- Mastic to 12"x12" Beige Floor Tile, Brown/Amber (Room 004)
- Mastic to 12"x12" Blue & Red Floor Tiles, Brown/Black (Room 202)
- 2'x4' Ceiling Tile, White (Room 003)
- 2'x4' Ceiling Tile, White (Room 104)
- 1'x1' Ceiling Tile, White (Room 102)
- Glue Daubs to 1'x1' Ceiling Tiles, Black (Room 102)
- Glue Daubs to 1'x1' Ceiling Tiles, Brown (Rooms 102 & 104)

- Vapor Barrier to Wood Floors (Original Build)
- Vapor Barrier to Wood Floors (Addition Build)
- Ceiling Plaster, finish coat (Original Build)
- Ceiling Plaster, scratch coat (Original Build)
- Wall Plaster, finish coat (Original Build)
- Wall Plaster, scratch coat (Original Build)
- Ceiling Plaster, finish coat (Auditorium)
- Ceiling Plaster, scratch coat (Auditorium Attic & Stage Attic)
- Ceiling Plaster, scratch coat (Addition Build)
- Wall Plaster, finish coat (Addition Build)
- Wall Plaster, scratch coat (Addition Build)
- Ceiling Plaster, finish coat (Addition Build)
- Ceiling Plaster, scratch coat (Addition Build)
- Gypsum Board (Room 003, at radiators)
- Joint Compound (Room 003, at radiators)
- Gypsum Board (Room 013, at radiators)
- Joint Compound (Room 013, at radiators)
- Gypsum Board (Rooms 204 & 204A)
- Joint Compound (Rooms 204 & 204A)
- Duct Vibration Dampener (Stage Attic)
- Brick Mortar (Original Building)
- Brick Mortar (Addition Building)

Refer to the Bulk Sample Results #32353 & #32354 for detailed sample information.

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. for project #20675 from March, 2021, indicate that the following materials are **classified as non-asbestos containing** (less than or equal to 1-percent) and may be removed or disturbed as regular construction materials:

- Vapor Barrier to Wood Floor (Room 102/Addition Build)

Refer to the Bulk Sample Results #29451 for detailed sample information.

The following materials are **classified as non-suspect** (not considered suspect asbestos containing materials by EPA or NYS DOL) and may be removed or disturbed as regular construction materials:

- Brick
- CMU
- Concrete
- Fiberglass Pipe Insulation w/Hard Fiberglass Elbows
- Rubber/Vinyl Wire Insulation
- Stone

The following **locations were not inspected** due to inaccessibility, the destructive nature of the testing and inability to repair the building component, live electrical or active mechanical components, or by directive of the client. Should work in these areas reveal previously unsampled suspect asbestos containing materials, these materials must be **assumed asbestos containing** and all activities in the area(s) must stop immediately until proper sample collection and laboratory analysis has been performed:

- No penetrations into floor decks were made
- No roofing materials were sampled
- Exterior probes were performed to facades of both the original and addition buildings and no tar/vapor barriers were observed. As these probes do not represent every location which will be affected by the work, contractors should notify the district should tar/vapor barriers be located during the course of work.

2.2 Asbestos Sampling Procedures

Samples of suspect asbestos materials were collected in accordance with United States Environmental Protection Agency guidelines as outlined below. These sampling procedures were implemented in an effort to minimize the release of asbestos fibers during sampling and to provide control of samples through analysis and reporting.

- Samples were collected in unoccupied areas.
- Surfaces of the material to be sampled were wetted with water mist prior to collection.
- Samples were collected with a cork borer, knife, or other approved sampling tool.

- Sampling tools were decontaminated between each sample.
- Individual sealable containers were used to contain each of the collected samples.
- Samples were double-bagged for transportation to the laboratory.
- Sample containers were labeled with a date and unique sample ID number using a permanent marker.

At the completion of sampling activities, bulk samples were relinquished to the laboratory for analysis. Enviroscience Consultants, LLC. is a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program accredited environmental testing laboratory (ELAP #11681). The laboratory is also accredited by the National Voluntary Laboratory Accreditation Program, (NVLAP Lab Code 200531-0).

All asbestos bulk samples were analyzed by Polarized Light Microscopy (PLM). Samples of cellulose ceiling tiles, and non-friable organically bound (NOB) materials such as floor tiles and roofing material, that were found to contain less than 1% asbestos by PLM were then analyzed using Transmission Electron Microscopy (TEM). According to the Department of Health, NOB materials may first be analyzed by PLM. If asbestos is not found using PLM, the sample must be analyzed with the higher-powered transmission electron microscope.

3.0 LEAD-BASED PAINT INSPECTION

3.1 Lead Inspection Procedures

Enviroscience Consultants, LLC. conducted a limited Lead-based Paint Inspection throughout select interior locations of Richard J. Bailey Elementary School. The purpose of the limited Lead-based Paint Inspection was to identify surfaces and building components which may be coated with lead-based paint. An EPA certified lead inspector/risk assessor used an X-ray Fluorescence (XRF) analyzer to test building components in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision.

3.2 Lead Sampling Results

Tested components and surfaces include:

- Plaster, Wall (C), Cream, Room 002
- Metal, Radiator, Cream, Room 002

- Wood, Baseboard, Cream, Room 002
- Plaster, Ceiling, White, Room 002
- Metal, Unit Ventilator, Cream, Room 004
- Plaster, Wall (C), Blue, Room 004
- Wood, Radiator Cover, Cream, Room 004
- Plaster, Ceiling, White, Room 004
- Wood Panel, Wall (C), Cream, Room 003
- Gypsum, Wall (C), Cream, Room 003
- Metal, Radiator, Silver, Room 003
- Metal, Unit Ventilator, Aqua, Room 006
- Plaster, Wall (C), Aqua, Room 006
- Metal, Radiator, White, Room 006
- Plaster, Ceiling, Beige, Room 006
- Wood, Unit Ventilator, Aqua, Room 008
- Plaster, Wall (C), Aqua, Room 008
- Wood, Radiator Cover, Aqua, Room 008
- Plaster, Ceiling, Cream, Room 008
- CMU, Wall (C), White, Computer Room
- Brick, Wall (C), White, Computer Room
- Metal, Radiator, White, Computer Room
- Concrete, Floor, Gray, Computer Room
- Concrete, Ceiling, Blue, Computer Room
- Concrete, Ceiling, White, Computer Room
- CMU, Wall (C), Gray, Art Room
- Brick, Wall (C), Gray, Art Room
- Metal, Radiator, Cream, Art Room
- Concrete, Floor, Gray, Art Room
- Concrete, Ceiling, Cream, Art Room
- Brick, Wall (B), Gray, Art Room
- Wood, Panel, Gray, Art Room
- Metal, Ladder, Yellow, Art Room
- Plaster, Wall (C), Cream, Room 013
- Gypsum, Wall (C), Cream, Room 013
- Metal, Radiator, Silver, Room 013
- Metal, Ladder, Yellow, Room 013
- Plaster, Wall (B), Cream, Room 013
- Gypsum, Wall (B), Cream, Room 013
- Plaster, Ceiling, Cream, Room 013
- Metal, Unit Ventilator, Cream, Room 114
- Plaster, Wall (C), Cream, Room 114
- Metal, Radiator, Brown, Room 114
- Wood, Baseboard, Brown, Room 114
- Wood, Window Shelf Leg, Cream, Room 114

- Wood, Window Shelf, Cream, Room 114
- Plaster, Ceiling, Cream, Room 114
- Metal, Unit Ventilator, Cream, Room 113
- Plaster, Wall (C), Cream, Room 113
- Metal, Radiator, Brown, Room 113
- Wood, Baseboard, Brown, Room 113
- Wood, Window Stool, Brown, Room 113
- Plaster, Ceiling, Cream, Room 113
- Metal, Unit Ventilator, Cream, Room 112
- Plaster, Wall (C), Cream, Room 112
- Metal, Radiator, Brown, Room 112
- Wood, Window Shelf Leg, Cream, Room 112
- Wood, Window Shelf, Cream, Room 112
- Wood, Baseboard, Brown, Room 112
- Plaster, Ceiling, Cream, Room 112
- Metal, Unit Ventilator, Cream, Room 108
- Plaster, Wall (C), Cream, Room 108
- Metal, Radiator, Brown, Room 108
- Wood, Window Shelf Leg, White, Room 108
- Wood, Window Shelf, White, Room 108
- Wood, Baseboard, Brown, Room 108
- Plaster, Ceiling, Cream, Room 108
- Metal, Unit Ventilator, Cream, Room 106
- Plaster, Wall (C), Cream, Room 106
- Metal, Radiator, Cream, Room 106
- Wood, Window Shelf Leg, Cream, Room 106
- Wood, Window Shelf, Cream, Room 106
- Wood, Baseboard, Brown, Room 106
- Plaster, Ceiling, Cream, Room 106
- Plaster, Wall (C), Cream, Room 104
- Metal, Radiator, Brown, Room 104
- Plaster, Baseboard, Black, Room 104
- Plaster, Ceiling, White, Room 104
- Metal, Unit Ventilator, Cream, Room 102
- Plaster, Wall (C), Cream, Room 102
- Metal, Radiator, Brown, Room 102
- Wood, Window Shelf, Cream, Room 102
- Wood, Baseboard, Black, Room 102
- Plaster, Ceiling, Cream, Room 102
- Metal, Unit Ventilator, Cream, Room 103
- Plaster, Wall (C), Cream, Room 103
- Metal, Radiator, Brown, Room 103
- Wood, Window Shelf, Cream, Room 103

- Wood, Baseboard, Brown, Room 103
- Plaster, Ceiling, Cream, Room 103
- Metal, Unit Ventilator, Brown, Room 100
- Plaster, Wall (C), Cream, Room 100
- Metal, Radiator, Yellow, Room 100
- Wood, Window Shelf, Brown, Room 100
- Wood, Baseboard, Brown, Room 100
- Plaster, Ceiling, Cream, Room 100
- Metal, Unit Ventilator, White, Room 101
- Plaster, Wall (C), Cream, Room 101
- Metal, Radiator, Brown, Room 101
- Wood, Window Shelf, Cream, Room 101
- Wood, Baseboard, Brown, Room 101
- Plaster, Ceiling, Cream, Room 101
- Metal, Unit Ventilator, Cream, Room 200
- Plaster, Wall (C), Cream, Room 200
- Metal, Radiator, Brown, Room 200
- Wood, Window Shelf, Cream, Room 200
- Wood, Baseboard, Brown, Room 200
- Metal, Unit Ventilator, Cream, Room 201
- Plaster, Wall (C), Cream, Room 201
- Metal, Radiator, Brown, Room 201
- Wood, Window Shelf, Cream, Room 201
- Wood, Baseboard, Brown, Room 201
- Metal, Unit Ventilator, Cream, Room 203
- Plaster, Wall (C), Cream, Room 203
- Metal, Radiator, Brown, Room 203
- Wood, Window Shelf, Cream, Room 203
- Wood, Baseboard, Brown, Room 203
- Metal, Unit Ventilator, Cream, Room 202
- Plaster, Wall (C), Cream, Room 202
- Metal, Radiator, Brown, Room 202
- Wood, Window Shelf, Cream, Room 202
- Wood, Baseboard, Brown, Room 202
- Metal, Unit Ventilator, Cream, Room 204
- Plaster, Wall (C), Cream, Room 204
- Metal, Radiator, Brown, Room 204
- Wood, Baseboard, Brown, Room 204
- Gypsum, Wall (D), Cream, Room 204
- Metal, Unit Ventilator, Cream, Room 204A
- Plaster, Wall (C), Cream, Room 204A
- Wood, Radiator, Brown, Room 204A
- Gypsum, Wall (B), Cream, Room 204A

- Metal, Unit Ventilator, Cream, Room 206
- Plaster, Wall (C), Cream, Room 206
- Metal, Radiator, Brown, Room 206
- Wood, Window Shelf, Cream, Room 206
- Wood, Baseboard, Brown, Room 206
- Plaster, Wall (C), Cream, Room 208
- Metal, Radiator, Brown, Room 208
- Wood, Window Shelf, Cream, Room 208
- Plaster, Baseboard, Black, Room 208
- Metal, Unit Ventilator, Cream, Library
- Plaster, Wall (C), Cream, Library
- Metal, Radiator, Brown, Library
- Wood, Baseboard, Black, Library
- Metal, Unit Ventilator, Cream, Room 212
- Plaster, Wall (C), Cream, Room 212
- Metal, Radiator, Brown, Room 212
- Wood, Window Shelf, Cream, Room 212
- Wood, Baseboard, Brown, Room 212
- Metal, Unit Ventilator, Cream, Room 213
- Plaster, Wall (C), Cream, Room 213
- Wood, Radiator Cover, Cream, Room 213
- Wood, Baseboard, Brown, Room 213
- Plaster, Wall (C), Cream, Room 214
- Metal, Radiator, Brown, Room 214
- Wood, Window Shelf, Cream, Room 214
- Wood, Baseboard, Brown, Room 214

Lead amounts greater than or equal to 1.0 mg/cm² have been identified in the components listed below:

- Plaster, Wall (C), Cream, Room 002
- Metal, Unit Ventilator, Cream, Room 004
- Metal, Unit Ventilator, Aqua, Room 006
- Plaster, Wall (C), Aqua, Room 006
- Metal, Radiator, White, Room 006
- Plaster, Wall (C), Aqua, Room 008
- Brick, Wall (B), Gray, Art Room
- Metal, Radiator, Silver, Room 013
- Metal, Unit Ventilator, Cream, Room 114
- Metal, Radiator, Brown, Room 114
- Wood, Baseboard, Brown, Room 114
- Metal, Unit Ventilator, Cream, Room 113
- Wood, Baseboard, Brown, Room 113

- Metal, Unit Ventilator, Cream, Room 112
- Metal, Radiator, Brown, Room 112
- Wood, Baseboard, Brown, Room 112
- Metal, Unit Ventilator, Cream, Room 108
- Metal, Radiator, Brown, Room 108
- Wood, Baseboard, Brown, Room 108
- Metal, Unit Ventilator, Cream, Room 106
- Plaster, Wall (C), Cream, Room 106
- Metal, Radiator, Cream, Room 106
- Wood, Baseboard, Brown, Room 106
- Metal, Radiator, Brown, Room 104
- Metal, Radiator, Brown, Room 102
- Metal, Radiator, Brown, Room 103
- Metal, Radiator, Yellow, Room 100
- Metal, Radiator, Brown, Room 101
- Metal, Radiator, Brown, Room 202
- Plaster, Wall (C), Cream, Room 204
- Wood, Baseboard, Brown, Room 204
- Plaster, Wall (C), Cream, Room 204A
- Wood, Radiator, Brown, Room 204A
- Metal, Unit Ventilator, Cream, Room 206
- Plaster, Wall (C), Cream, Room 206
- Metal, Radiator, Brown, Room 206
- Wood, Baseboard, Brown, Room 206
- Metal, Radiator, Brown, Room 208
- Metal, Unit Ventilator, Cream, Library
- Plaster, Wall (C), Cream, Library
- Metal, Radiator, Brown, Library
- Wood, Baseboard, Black, Library
- Metal, Unit Ventilator, Cream, Room 212
- Plaster, Wall (C), Cream, Room 212
- Metal, Radiator, Brown, Room 212
- Wood, Baseboard, Brown, Room 212
- Metal, Unit Ventilator, Cream, Room 213
- Plaster, Wall (C), Cream, Room 213
- Wood, Baseboard, Brown, Room 213
- Plaster, Wall (C), Cream, Room 214
- Metal, Radiator, Brown, Room 214
- Wood, Baseboard, Brown, Room 214

All other surfaces and components tested for lead-based paint were below 1.0 mg/cm². All workers involved in construction and demolition activities are covered under The OSHA Lead

Exposure in Construction Rule (29 CFR 1926.62). OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount. This standard requires workers to be trained and protected from lead exposure by use of engineering controls, respiratory protection, protective clothing and medical surveillance when airborne concentration of lead exceed established personal exposure limit (PEL) levels.

Complete Lead XRF Results are located in Appendix D.

Please reference Enviroscience Consultants, LLC. certifications in Appendix F.

Appendix A
Asbestos Bulk Sample Results

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	1 of 5	SAMPLER:	Drew Cheskin
		CUSTODY #:	32353

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90138	01-01	12"x12" Floor Tile	White	Room 004	None Detected by TEM		None Detected	63.1% organics and carbonates 36.9% silicates and opaques
90139	01-02	12"x12" Floor Tile	White	Room 004	None Detected by TEM		None Detected	56.7% organics and carbonates 43.3% silicates and opaques
90140	02-03	Mastic to 12"x12" White Floor Tile	Brown	Room 004	None Detected by TEM		None Detected	53.8% organics and carbonates 46.2% silicates and opaques
90141	02-04	Mastic to 12"x12" White Floor Tile	Brown	Room 004	None Detected by TEM		None Detected	59.5% organics and carbonates 40.5% silicates and opaques
90142	03-05	12"x12" Floor Tile	Beige	Room 004	None Detected by TEM		None Detected	96.3% organics and carbonates 3.7% silicates and opaques
90143	03-06	12"x12" Floor Tile	Beige	Room 004	None Detected by TEM		None Detected	99.8% organics and carbonates 0.2% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 ANALYZED BY: John F. Spillito PLM DATE: 3/9/2022

 ANALYZED BY: Edmund I. Stettin TEM DATE: 3/9/2022

 DIRECTOR: Edmund I. Stettin DATE: 3/10/2022

 REVISION #: 0 REVISION DATE: 3/10/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	2 of 5	SAMPLER:	Drew Cheskin
		CUSTODY #:	32353

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90144	04-07	Mastic to 12"x12" Beige Floor Tile	Brown/Amber	Room 004	None Detected by TEM		None Detected	73.1% organics and carbonates 26.9% silicates and opaques
90145	04-08	Mastic to 12"x12" Beige Floor Tile	Brown/Amber	Room 004	None Detected by TEM		None Detected	75.8% organics and carbonates 24.2% silicates and opaques
90146	05-09	12"x12" Floor Tile	Blue	Room 202	3.2% Asbestos by TEM	3.2% Chrysotile by TEM	None Detected	92.1% organics and carbonates 4.7% silicates and opaques
90147	05-10	12"x12" Floor Tile	Blue	Room 202	2.8% Asbestos by TEM	2.8% Chrysotile by TEM	None Detected	93.1% organics and carbonates 4.1% silicates and opaques
90148	06-11	12"x12" Floor Tile	Red	Room 202	1.6% Asbestos	1.6% Chrysotile	None Detected	91.6% organics and carbonates 6.8% silicates and opaques
90149	06-12	12"x12" Floor Tile	Red	Room 202	1.6% Asbestos	1.6% Chrysotile	None Detected	90.7% organics and carbonates 7.7% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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ANALYZED BY: John F. Spillito PLM DATE: 3/9/2022

ANALYZED BY: Edmund J. Stettin TEM DATE: 3/9/2022

DIRECTOR: Edmund J. Stettin DATE: 3/10/2022

REVISION #: 0 REVISION DATE: 3/10/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	3 of 5	SAMPLER:	Drew Cheskin
		CUSTODY #:	32353

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90150	07-13	Mastic to 12"x12" Blue & Red Floor Tiles	Brown/Black	Room 202	None Detected by TEM		None Detected	47.0% organics and carbonates 53.0% silicates and opaques
90151	07-14	Mastic to 12"x12" Blue & Red Floor Tiles	Brown/Black	Room 202	None Detected by TEM		None Detected	69.5% organics and carbonates 30.5% silicates and opaques
90152	08-15	2'x4' Ceiling Tile	White	Room 003	None Detected by TEM		32.4% mineral wool	35.3% organics and carbonates 32.3% silicates and opaques
90153	08-16	2'x4' Ceiling Tile	White	Room 003	None Detected by TEM		32.1% mineral wool	35.8% organics and carbonates 32.1% silicates and opaques
90154	09-17	2'x4' Ceiling Tile	White	Room 104	None Detected by TEM		27.4% mineral wool	45.2% organics and carbonates 27.4% silicates and opaques
90155	09-18	2'x4' Ceiling Tile	White	Room 104	None Detected by TEM		29.0% mineral wool	42.1% organics and carbonates 28.9% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 ANALYZED BY: John F. Spillito PLM DATE: 3/9/2022

 ANALYZED BY: Edmund I. Stettin TEM DATE: 3/9/2022

 DIRECTOR: Edmund I. Stettin DATE: 3/10/2022

 REVISION #: 0 REVISION DATE: 3/10/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	4 of 5	SAMPLER:	Drew Cheskin
		CUSTODY #:	32353

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90156	10-19	1'x1' Ceiling Tile	White	Room 102	None Detected by TEM		None Detected	78.8% organics and carbonates 21.2% silicates and opaques
90157	10-20	1'x1' Ceiling Tile	White	Room 102	None Detected by TEM		None Detected	98.5% organics and carbonates 1.5% silicates and opaques
90158	11-21	Glue Daubs to 1'x1' Ceiling Tiles	Black	Room 102	None Detected by TEM		None Detected	51.7% organics and carbonates 48.3% silicates and opaques
90159	11-22	Glue Daubs to 1'x1' Ceiling Tiles	Black	Room 102	None Detected by TEM		None Detected	51.6% organics and carbonates 48.4% silicates and opaques
90160	12-23	Glue Daubs to 1'x1' Ceiling Tiles	Brown	Room 102	None Detected by TEM		None Detected	52.6% organics and carbonates 47.4% silicates and opaques
90161	12-24	Glue Daubs to 1'x1' Ceiling Tiles	Brown	Room 104	None Detected by TEM		None Detected	52.3% organics and carbonates 47.7% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

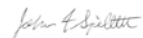
Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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ANALYZED BY:



PLM DATE:

3/9/2022

ANALYZED BY:



TEM DATE:

3/9/2022

DIRECTOR:



DATE:

3/10/2022

REVISION #:

0

REVISION DATE:

3/10/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	5 of 5	SAMPLER:	Drew Cheskin
		CUSTODY #:	32353

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90162	13-25	Vapor Barrier to Wood Floors	Black	Room 108	None Detected by TEM		None Detected	57.2% organics and carbonates 42.8% silicates and opaques
90163	13-26	Vapor Barrier to Wood Floors	Black	Library	None Detected by TEM		None Detected	98.7% organics and carbonates 1.3% silicates and opaques
90164	14-27	Vapor Barrier to Wood Floors	Black	Room 213	None Detected by TEM		None Detected	98.6% organics and carbonates 1.4% silicates and opaques
90165	14-28	Vapor Barrier to Wood Floors	Black	Room 213	None Detected by TEM		None Detected	98.5% organics and carbonates 1.5% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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ANALYZED BY: *John F. Spillito* PLM DATE: 3/9/2022

ANALYZED BY: *Edward J. Stettin* TEM DATE: 3/9/2022

DIRECTOR: *Edward J. Stettin* DATE: 3/10/2022

REVISION #: 0 REVISION DATE: 3/10/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	1 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90166	15-29	Ceiling Plaster, finish coat	White	Room 006 (original build)	None Detected		2.0% cellulose	98.0% plaster
90167	15-30	Ceiling Plaster, finish coat	White	Room 008 (original build)	None Detected		2.0% cellulose	98.0% plaster
90168	15-31	Ceiling Plaster, finish coat	White	Room 104 (original build)	None Detected		2.0% cellulose	98.0% plaster
90169	15-32	Ceiling Plaster, finish coat	White	Room 106 (original build)	None Detected		2.0% cellulose	98.0% plaster
90170	15-33	Ceiling Plaster, finish coat	White	Room 108 (original build)	None Detected		2.0% cellulose	98.0% plaster
90171	15-34	Ceiling Plaster, finish coat	White	Room 112 (original build)	None Detected		2.0% cellulose	98.0% plaster
90172	15-35	Ceiling Plaster, finish coat	White	Room 204 (original build)	None Detected		2.0% cellulose	98.0% plaster
90173	15-36	Ceiling Plaster, finish coat	White	Room 208 (original build)	None Detected		2.0% cellulose	98.0% plaster
90174	15-37	Ceiling Plaster, finish coat	White	Library (original build)	None Detected		2.0% cellulose	98.0% plaster
90175	16-38	Ceiling Plaster, scratch coat	Brown/Gray	Room 006 (original build)	None Detected		3.0% cellulose	97.0% cement

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 ANALYZED BY: John F. Spillone PLM DATE: 3/7/2022

ANALYZED BY: _____ TEM DATE: _____

 DIRECTOR: Edward J. Spillone DATE: 3/8/2022

 REVISION #: 0 REVISION DATE: 3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	2 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90176	16-39	Ceiling Plaster, scratch coat	Brown/Gray	Room 008 (original build)	None Detected		3.0% cellulose	97.0% cement
90177	16-40	Ceiling Plaster, scratch coat	Brown/Gray	Room 104 (original build)	None Detected		3.0% cellulose	97.0% cement
90178	16-41	Ceiling Plaster, scratch coat	Brown/Gray	Room 106 (original build)	None Detected		3.0% cellulose	97.0% cement
90179	16-42	Ceiling Plaster, scratch coat	Brown/Gray	Room 108 (original build)	None Detected		3.0% cellulose	97.0% cement
90180	16-43	Ceiling Plaster, scratch coat	Brown/Gray	Room 112 (original build)	None Detected		3.0% cellulose	97.0% cement
90181	16-44	Ceiling Plaster, scratch coat	Brown/Gray	Room 204 (original build)	None Detected		3.0% cellulose	97.0% cement
90182	16-45	Ceiling Plaster, scratch coat	Brown/Gray	Room 208 (original build)	None Detected		3.0% cellulose	97.0% cement
90183	16-46	Ceiling Plaster, scratch coat	Brown/Gray	Library (original build)	None Detected		3.0% cellulose	97.0% cement
90184	17-47	Wall Plaster, finish coat	White/Beige	Room 006 (original build)	None Detected		2.0% cellulose	98.0% plaster
90185	17-48	Wall Plaster, finish coat	White/Beige	Room 008 (original build)	None Detected		2.0% cellulose	98.0% plaster

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 ANALYZED BY: John F. Spillone PLM DATE: 3/7/2022

ANALYZED BY: _____ TEM DATE: _____

 DIRECTOR: Edward J. Spillone DATE: 3/8/2022

 REVISION #: 0 REVISION DATE: 3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	3 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90186	17-49	Wall Plaster, finish coat	White/Beige	Room 104 (original build)	None Detected		2.0% cellulose	98.0% plaster
90187	17-50	Wall Plaster, finish coat	White/Beige	Room 106 (original build)	None Detected		2.0% cellulose	98.0% plaster
90188	17-51	Wall Plaster, finish coat	White/Beige	Room 108 (original build)	None Detected		2.0% cellulose	98.0% plaster
90189	17-52	Wall Plaster, finish coat	White/Beige	Room 112 (original build)	None Detected		2.0% cellulose	98.0% plaster
90190	17-53	Wall Plaster, finish coat	White/Beige	Room 204 (original build)	None Detected		2.0% cellulose	98.0% plaster
90191	17-54	Wall Plaster, finish coat	White/Beige	Room 208 (original build)	None Detected		2.0% cellulose	98.0% plaster
90192	17-55	Wall Plaster, finish coat	White/Beige	Library (original build)	None Detected		2.0% cellulose	98.0% plaster
90193	18-56	Wall Plaster, scratch coat	Brown/Gray	Room 006 (original build)	None Detected		3.0% cellulose	97.0% cement
90194	18-57	Wall Plaster, scratch coat	Brown/Gray	Room 008 (original build)	None Detected		3.0% cellulose	97.0% cement
90195	18-58	Wall Plaster, scratch coat	Brown/Gray	Room 104 (original build)	None Detected		3.0% cellulose	97.0% cement

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

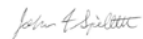
Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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ANALYZED BY:



PLM DATE:

3/7/2022

ANALYZED BY:

TEM DATE:

DIRECTOR:



DATE:

3/8/2022

REVISION #:

0

REVISION DATE:

3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	4 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90196	18-59	Wall Plaster, scratch coat	Brown/Gray	Room 106 (original build)	None Detected		3.0% cellulose	97.0% cement
90197	18-60	Wall Plaster, scratch coat	Brown/Gray	Room 108 (original build)	None Detected		3.0% cellulose	97.0% cement
90198	18-61	Wall Plaster, scratch coat	Brown/Gray	Room 112 (original build)	None Detected		3.0% cellulose	97.0% cement
90199	18-62	Wall Plaster, scratch coat	Brown/Gray	Room 204 (original build)	None Detected		3.0% cellulose	97.0% cement
90200	18-63	Wall Plaster, scratch coat	Brown/Gray	Room 208 (original build)	None Detected		3.0% cellulose	97.0% cement
90201	18-64	Wall Plaster, scratch coat	Brown/Gray	Library (original build)	None Detected		3.0% cellulose	97.0% cement
90202	19-65	Ceiling Plaster, finish coat	White	Auditorium	None Detected		2.0% cellulose	98.0% plaster
90203	19-66	Ceiling Plaster, finish coat	White	Auditorium	None Detected		2.0% cellulose	98.0% plaster
90204	19-67	Ceiling Plaster, finish coat	White	Auditorium	None Detected		2.0% cellulose	98.0% plaster
90205	19-68	Ceiling Plaster, finish coat	White	Auditorium	None Detected		2.0% cellulose	98.0% plaster

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 ANALYZED BY: John F. Spillone PLM DATE: 3/7/2022

ANALYZED BY: _____ TEM DATE: _____

 DIRECTOR: Edward J. Spillone DATE: 3/8/2022

 REVISION #: 0 REVISION DATE: 3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	5 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90206	19-69	Ceiling Plaster, finish coat	White	Auditorium	None Detected		2.0% cellulose	98.0% plaster
90207	20-70	Ceiling Plaster, scratch coat	Brown	Auditorium	None Detected		3.0% cellulose	97.0% cement
90208	20-71	Ceiling Plaster, scratch coat	Brown	Auditorium	None Detected		3.0% cellulose	97.0% cement
90209	20-72	Ceiling Plaster, scratch coat	Brown	Auditorium	None Detected		3.0% cellulose	97.0% cement
90210	20-73	Ceiling Plaster, scratch coat	Brown	Auditorium	None Detected		3.0% cellulose	97.0% cement
90211	20-74	Ceiling Plaster, scratch coat	Brown	Stage	None Detected		3.0% cellulose	97.0% cement
90212	21-75	Ceiling Plaster, finish coat	White	Room 013 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90213	21-76	Ceiling Plaster, finish coat	White	Room 102 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90214	21-77	Ceiling Plaster, finish coat	White	Room 103 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90215	21-78	Ceiling Plaster, finish coat	White	Room 113 (addition build)	None Detected		2.0% cellulose	98.0% plaster

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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ANALYZED BY: John F. Spillone PLM DATE: 3/7/2022

ANALYZED BY: _____ TEM DATE: _____

DIRECTOR: Edward J. Spillone DATE: 3/8/2022

REVISION #: 0 REVISION DATE: 3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	6 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90216	21-79	Ceiling Plaster, finish coat	White	Room 200A (addition build)	None Detected		2.0% cellulose	98.0% plaster
90217	21-80	Ceiling Plaster, finish coat	White	Room 201 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90218	21-81	Ceiling Plaster, finish coat	White	Room 213 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90219	22-82	Ceiling Plaster, scratch coat	Brown	Room 013 (addition build)	None Detected		3.0% cellulose	97.0% cement
90220	22-83	Ceiling Plaster, scratch coat	Brown	Room 102 (addition build)	None Detected		3.0% cellulose	97.0% cement
90221	22-84	Ceiling Plaster, scratch coat	Brown	Room 103 (addition build)	None Detected		3.0% cellulose	97.0% cement
90222	22-85	Ceiling Plaster, scratch coat	Brown	Room 113 (addition build)	None Detected		3.0% cellulose	97.0% cement
90223	22-86	Ceiling Plaster, scratch coat	Brown	Room 200A (addition build)	None Detected		3.0% cellulose	97.0% cement
90224	22-87	Ceiling Plaster, scratch coat	Brown	Room 201 (addition build)	None Detected		3.0% cellulose	97.0% cement
90225	22-88	Ceiling Plaster, scratch coat	Brown	Room 213 (addition build)	None Detected		3.0% cellulose	97.0% cement

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

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ANALYZED BY: John F. Spillone PLM DATE: 3/7/2022

ANALYZED BY: _____ TEM DATE: _____

DIRECTOR: Edward J. Spillone DATE: 3/8/2022

REVISION #: 0 REVISION DATE: 3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	7 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90226	23-89	Wall Plaster, finish coat	White/Beige	Room 013 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90227	23-90	Wall Plaster, finish coat	White/Beige	Room 102 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90228	23-91	Wall Plaster, finish coat	White/Beige	Room 103 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90229	23-92	Wall Plaster, finish coat	White/Beige	Room 113 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90230	23-93	Wall Plaster, finish coat	White/Beige	Room 200A (addition build)	None Detected		2.0% cellulose	98.0% plaster
90231	23-94	Wall Plaster, finish coat	White/Beige	Room 201 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90232	23-95	Wall Plaster, finish coat	White/Beige	Room 213 (addition build)	None Detected		2.0% cellulose	98.0% plaster
90233	24-96	Wall Plaster, scratch coat	Brown	Room 013 (addition build)	None Detected		3.0% cellulose	97.0% cement
90234	24-97	Wall Plaster, scratch coat	Brown	Room 102 (addition build)	None Detected		3.0% cellulose	97.0% cement
90235	24-98	Wall Plaster, scratch coat	Brown	Room 103 (addition build)	None Detected		3.0% cellulose	97.0% cement

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 ANALYZED BY: John F. Spillone PLM DATE: 3/7/2022

ANALYZED BY: _____ TEM DATE: _____

 DIRECTOR: Edward J. Spillone DATE: 3/8/2022

 REVISION #: 0 REVISION DATE: 3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	8 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90236	24-99	Wall Plaster, scratch coat	Brown	Room 113 (addition build)	None Detected		3.0% cellulose	97.0% cement
90237	24-100	Wall Plaster, scratch coat	Brown	Room 200A (addition build)	None Detected		3.0% cellulose	97.0% cement
90238	24-101	Wall Plaster, scratch coat	Brown	Room 201 (addition build)	None Detected		3.0% cellulose	97.0% cement
90239	24-102	Wall Plaster, scratch coat	Brown	Room 213 (addition build)	None Detected		3.0% cellulose	97.0% cement
90240	25-103	Gypsum Board	White/Gray	Room 003 (at radiators)	None Detected		20.0% cellulose	80.0% plaster
90241	25-104	Gypsum Board	White/Gray	Room 003 (at radiators)	None Detected		20.0% cellulose	80.0% plaster
90242	26-105	Joint Compound	White	Room 003 (at radiators)	None Detected		None Detected	47.6% organics and carbonates 52.4% silicates and opaques
90243	26-106	Joint Compound	White	Room 003 (at radiators)	None Detected		None Detected	42.7% organics and carbonates 57.3% silicates and opaques
90244	27-107	Gypsum Board	White/Gray	Room 013 (at radiators)	None Detected		20.0% cellulose	80.0% plaster

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 ANALYZED BY: *John F. Spillone* PLM DATE: 3/7/2022

ANALYZED BY: _____ TEM DATE: _____

 DIRECTOR: *Edward J. Spillone* DATE: 3/8/2022

 REVISION #: 0 REVISION DATE: 3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	9 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90245	27-108	Gypsum Board	White/Gray	Room 013 (at radiators)	None Detected		20.0% cellulose	80.0% plaster
90246	28-109	Joint Compound	White	Room 013 (at radiators)	None Detected		None Detected	67.6% organics and carbonates 32.4% silicates and opaques
90247	28-110	Joint Compound	White	Room 013 (at radiators)	None Detected		None Detected	60.7% organics and carbonates 39.3% silicates and opaques
90248	29-111	Gypsum Board	White/Gray	Room 204 (dividing wall)	None Detected		20.0% cellulose	80.0% plaster
90249	29-112	Gypsum Board	White/Gray	Room 204A (dividing wall)	None Detected		20.0% cellulose	80.0% plaster
90250	30-113	Joint Compound	White	Room 204 (dividing wall)	None Detected		None Detected	77.8% organics and carbonates 22.2% silicates and opaques
90251	30-114	Joint Compound	White	Room 204A (dividing wall)	None Detected		None Detected	86.5% organics and carbonates 13.5% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 ANALYZED BY: John F. Spillone PLM DATE: 3/7/2022

ANALYZED BY: _____ TEM DATE: _____

 DIRECTOR: Edward J. Spillone DATE: 3/8/2022

 REVISION #: 0 REVISION DATE: 3/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/28/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/28/2022
JOB #:	21819	AREA:	Richard Bailey ES
PAGE #:	10 of 10	SAMPLER:	Drew Cheskin
		CUSTODY #:	32354

Lab ID	Sample #	Description	Color	Location	Total Asbestos Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
90252	30-115	Joint Compound	White	Room 204A (dividing wall)	None Detected		None Detected	84.6% organics and carbonates 15.4% silicates and opaques
90253	31-116	Duct Vibration Dampener	Tan	Stage Attic	None Detected		90.0% cellulose	10.0% binders
90254	31-117	Duct Vibration Dampener	Tan	Stage Attic	None Detected		90.0% cellulose	10.0% binders
90255	31-118	Duct Vibration Dampener	Tan	Stage Attic	None Detected		90.0% cellulose	10.0% binders
90256	32-119	Brick Mortar	Gray	Original Building (exterior cut 2)	None Detected		3.0% cellulose	97.0% fiberglass
90257	32-120	Brick Mortar	Gray	Original Building (exterior cut 3)	None Detected		3.0% cellulose	97.0% fiberglass
90258	33-121	Brick Mortar	Gray	Addition Building (exterior cut 1)	None Detected		3.0% cellulose	97.0% fiberglass
90259	33-122	Brick Mortar	Gray	Addition Building (exterior cut 4)	None Detected		3.0% cellulose	97.0% fiberglass

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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ANALYZED BY: John F. Spillone PLM DATE: 3/7/2022

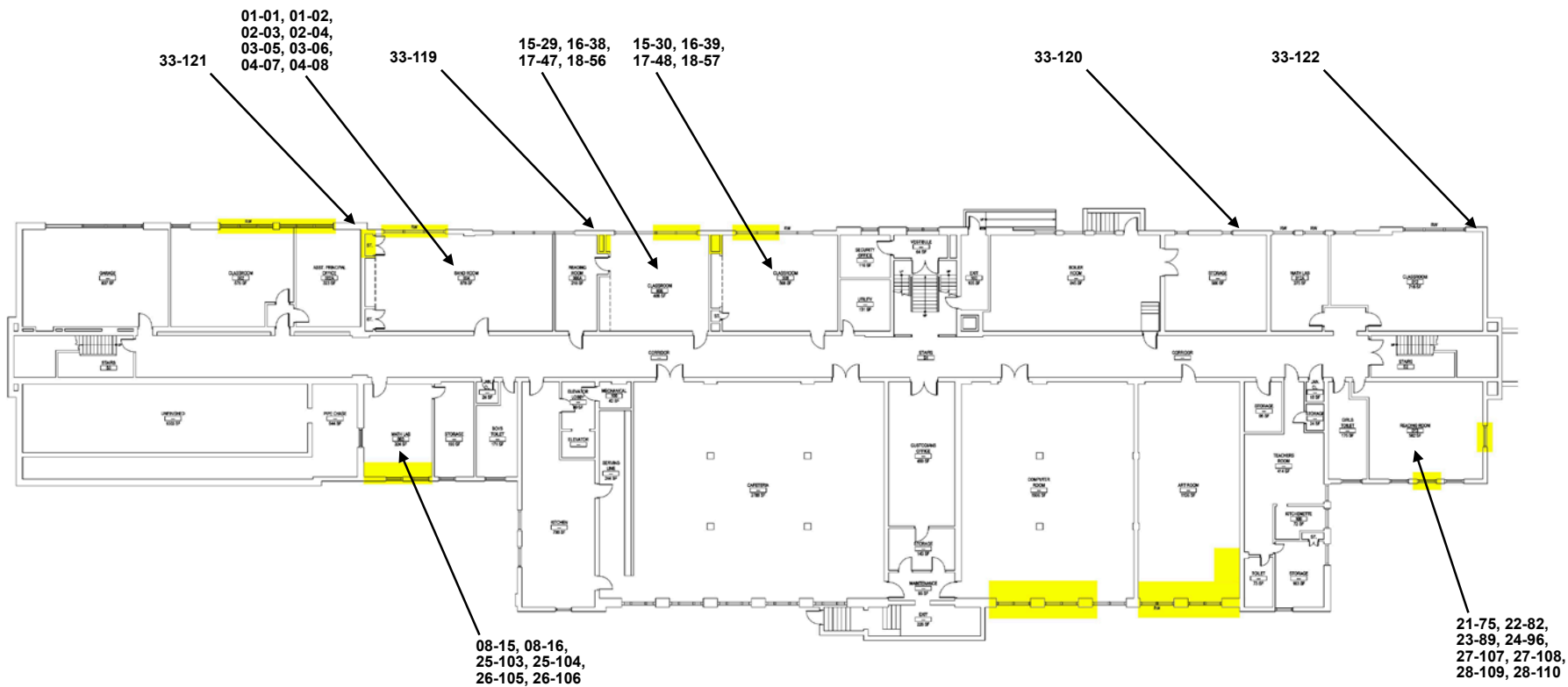
ANALYZED BY: _____ TEM DATE: _____

DIRECTOR: Edward J. Spillone DATE: 3/8/2022

REVISION #: 0 REVISION DATE: 3/8/2022

Appendix B
Asbestos Bulk Sample Location Drawings

**BAILEY ELEMENTARY SCHOOL
BASEMENT**



ENVIROSCIENCE
CONSULTANTS, INC
2150 SMITHTOWN AVENUE
RONKONKOMA, NY 11779
(631) 580-3191
FAX 580-3195
www.envirohealth.org

KEY PLAN
NO SCALE

PROJECT

**DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS**

CLIENT

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

COMMENTS:

**RICHARD J. BAILEY ES
BASEMENT
BULK SAMPLE LOCATION PLAN**

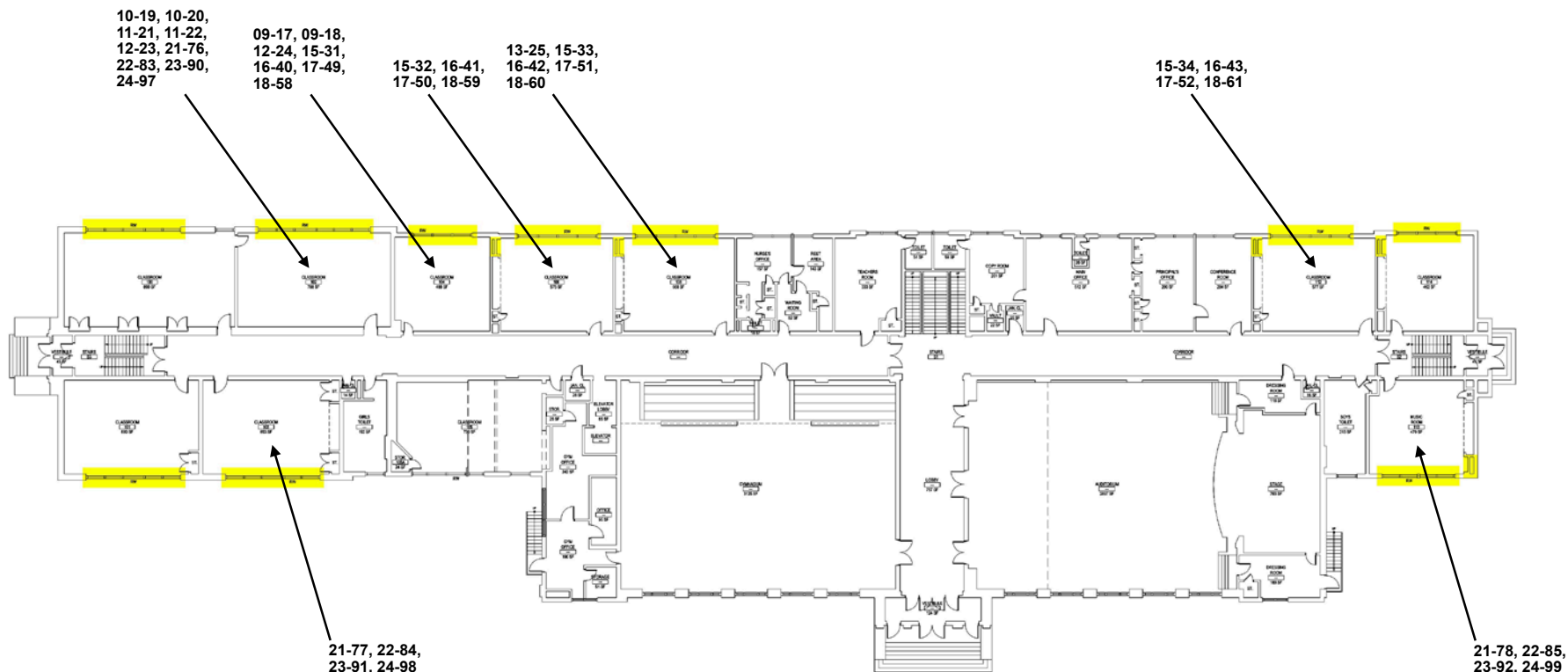
NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 1 of 4

**BAILEY ELEMENTARY SCHOOL
FIRST FLOOR**



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CONSULTANTS, INC
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KEY PLAN
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**DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS**

CLIENT

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

COMMENTS:
RICHARD J. BAILEY ES
FIRST FLOOR
BULK SAMPLE LOCATION PLAN

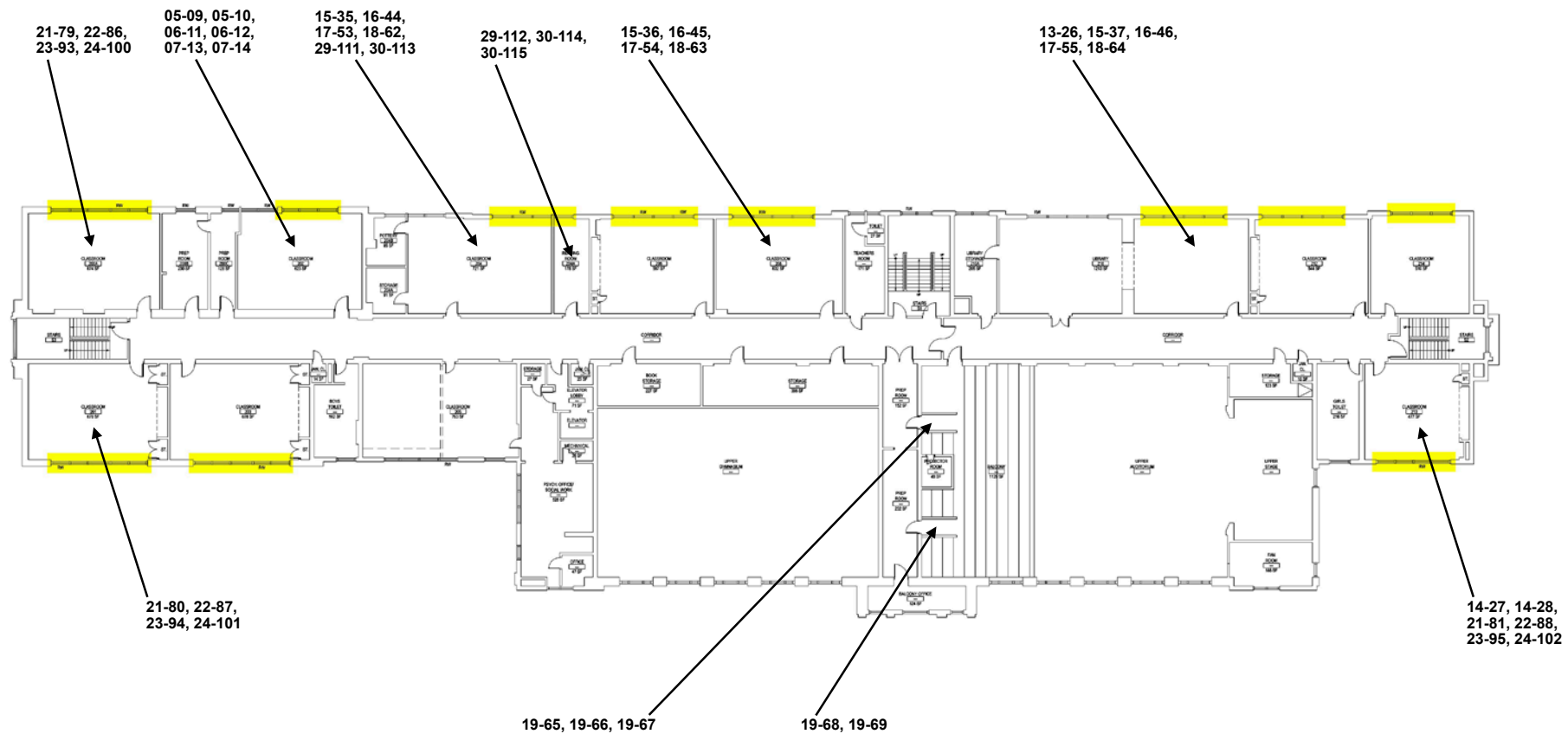
NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 2 of 4

**BAILEY ELEMENTARY SCHOOL
SECOND FLOOR**



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DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS

CLIENT

GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607

PROJECT #: 21819

COMMENTS:

RICHARD J. BAILEY ES
SECOND FLOOR
BULK SAMPLE LOCATION PLAN

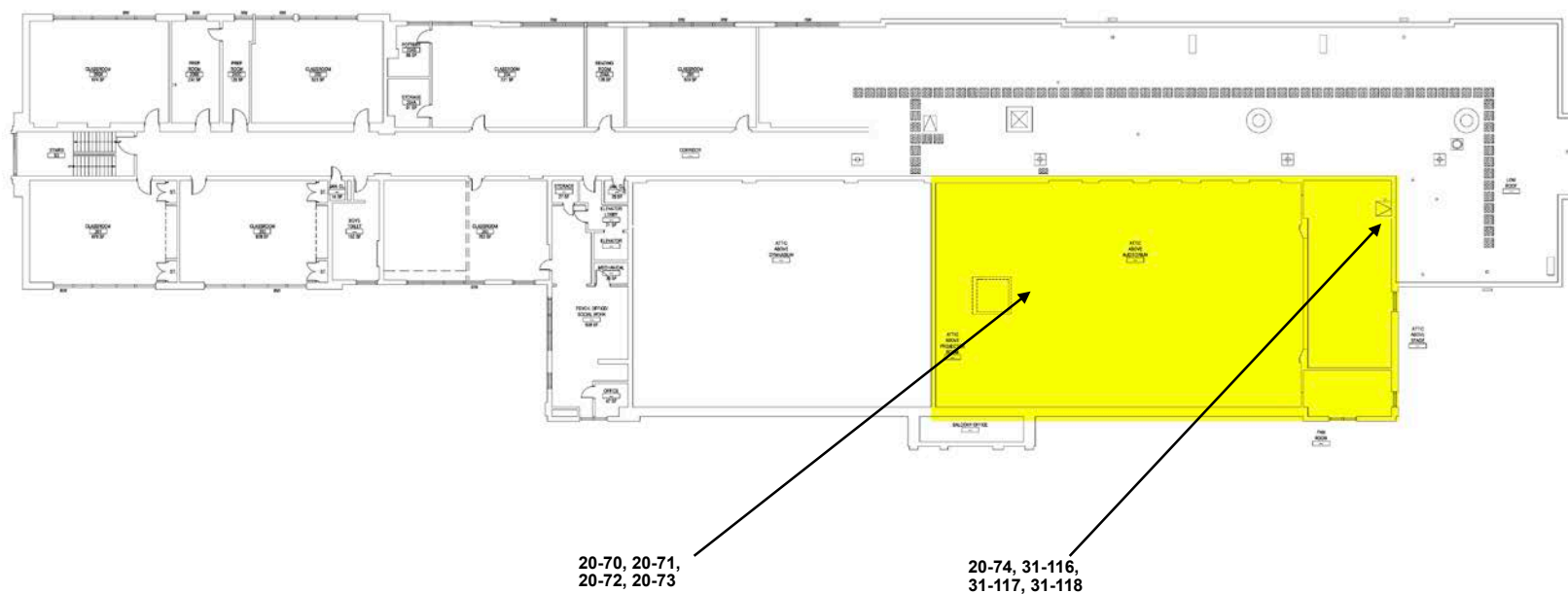
NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 3 of 4

**BAILEY ELEMENTARY SCHOOL
ATTIC**



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& LEAD INSPECTIONS**

CLIENT

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

COMMENTS:

RICHARD J. BAILEY ES

ATTIC

BULK SAMPLE LOCATION PLAN

NOT TO SCALE

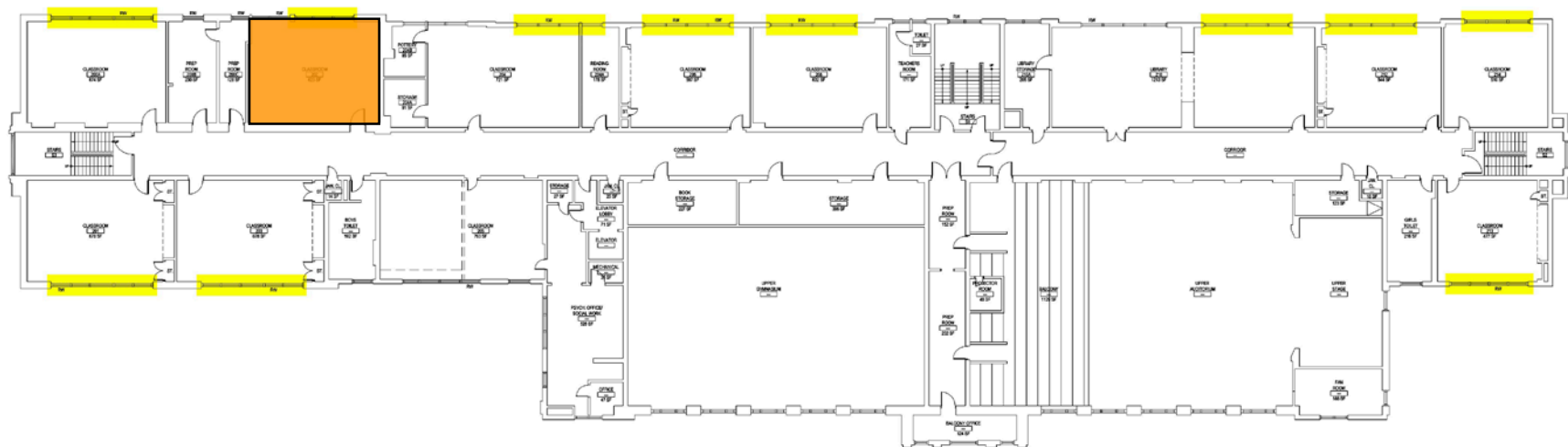
Date: 03/08/2022

By: Drew Cheskin

DRAWING 4 of 4

Appendix C
Asbestos Containing Materials Location Drawings

**BAILEY ELEMENTARY SCHOOL
SECOND FLOOR**



Location of Asbestos Containing 12"x12" Floor Tiles, Blue & Red



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KEY PLAN
NO SCALE

PROJECT

DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS

CLIENT

GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607

PROJECT #: 21819

COMMENTS:
RICHARD J. BAILEY ES
SECOND FLOOR
ASBESTOS CONTAINING MATERIALS
LOCATION PLAN

NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 1 of 1

Appendix D
Lead XRF Results

Client: Greenburgh Central School District	Date: February 9, 2022
Project: Richard J. Bailey Elementary School	Job #: 21819
Inspector Name: Drew Cheskin	Signature: <i>Drew Cheskin</i>
	XRF Serial Number: 26952

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1477	-	-	-	Calibration Check	1.10	-
1478	-	-	-	Calibration Check	1.20	-
1479	-	-	-	Calibration Check	1.10	-
1480	Plaster	Wall (C)	Cream	Room 002	9.20	Positive
1481	Metal	Radiator	Cream	Room 002	0.05	Negative
1482	Wood	Baseboard	Cream	Room 002	-0.60	Negative
1483	Plaster	Ceiling	White	Room 002	-0.51	Negative
1484	Metal	Unit Ventilator	Cream	Room 004	2.30	Positive
1485	Plaster	Wall (C)	Blue	Room 004	0.30	Negative
1486	Wood	Radiator Cover	Cream	Room 004	0.00	Negative
1487	Plaster	Ceiling	White	Room 004	0.00	Negative
1488	Wood Panel	Wall (C)	Cream	Room 003	0.00	Negative
1489	Gypsum	Wall (C)	Cream	Room 003	0.00	Negative
1490	Metal	Radiator	Silver	Room 003	0.29	Negative
1491	Metal	Unit Ventilator	Aqua	Room 006	3.60	Positive

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1492	Plaster	Wall (C)	Aqua	Room 006	11.00	Positive
1493	Metal	Radiator	White	Room 006	7.60	Positive
1494	Plaster	Ceiling	Beige	Room 006	0.07	Negative
1495	Wood	Unit Ventilator	Aqua	Room 008	0.00	Negative
1496	Plaster	Wall (C)	Aqua	Room 008	24.20	Positive
1497	Wood	Radiator Cover	Aqua	Room 008	0.00	Negative
1498	Plaster	Ceiling	Cream	Room 008	0.06	Negative
1499	CMU	Wall (C)	White	Computer Room	0.18	Negative
1500	Brick	Wall (C)	White	Computer Room	0.27	Negative
1501	Metal	Radiator	White	Computer Room	0.60	Negative
1502	Concrete	Floor	Gray	Computer Room	0.06	Negative
1503	Concrete	Ceiling	Blue	Computer Room	0.00	Negative
1504	Concrete	Ceiling	White	Computer Room	0.00	Negative
1505	CMU	Wall (C)	Gray	Art Room	0.00	Negative
1506	Brick	Wall (C)	Gray	Art Room	-0.55	Negative
1507	Metal	Radiator	Cream	Art Room	0.40	Negative
1508	Concrete	Floor	Gray	Art Room	0.60	Negative
1509	Concrete	Ceiling	Cream	Art Room	0.00	Negative
1510	Brick	Wall (B)	Gray	Art Room	1.50	Positive
1511	Wood	Panel	Gray	Art Room	0.00	Negative
1512	Metal	Ladder	Yellow	Art Room	0.00	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1513	Plaster	Wall (C)	Cream	Room 013	0.17	Negative
1514	Gypsum	Wall (C)	Cream	Room 013	0.00	Negative
1515	Metal	Radiator	Silver	Room 013	2.80	Positive
1516	Metal	Ladder	Yellow	Room 013	0.01	Negative
1517	Plaster	Wall (B)	Cream	Room 013	0.03	Negative
1518	Gypsum	Wall (B)	Cream	Room 013	0.00	Negative
1519	Plaster	Ceiling	Cream	Room 013	0.06	Negative
1520	Metal	Unit Ventilator	Cream	Room 114	7.70	Positive
1521	Plaster	Wall (C)	Cream	Room 114	-0.62	Negative
1522	Metal	Radiator	Brown	Room 114	5.90	Positive
1523	Wood	Baseboard	Brown	Room 114	5.10	Positive
1524	Wood	Window Shelf Leg	Cream	Room 114	0.13	Negative
1525	Wood	Window Shelf	Cream	Room 114	0.09	Negative
1526	Plaster	Ceiling	Cream	Room 114	0.36	Negative
1527	Metal	Unit Ventilator	Cream	Room 113	6.40	Positive
1528	Plaster	Wall (C)	Cream	Room 113	0.30	Negative
1529	Metal	Radiator	Brown	Room 113	-0.10	Negative
1530	Wood	Baseboard	Brown	Room 113	5.00	Positive
1531	Wood	Window Stool	Brown	Room 113	0.07	Negative
1532	Plaster	Ceiling	Cream	Room 113	0.11	Negative
1533	Metal	Unit Ventilator	Cream	Room 112	4.90	Positive

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1534	Plaster	Wall (C)	Cream	Room 112	0.15	Negative
1535	Metal	Radiator	Brown	Room 112	9.80	Positive
1536	Wood	Window Shelf Leg	Cream	Room 112	0.05	Negative
1537	Wood	Window Shelf	Cream	Room 112	0.01	Negative
1538	Wood	Baseboard	Brown	Room 112	6.30	Positive
1539	Plaster	Ceiling	Cream	Room 112	-0.29	Negative
1540	Metal	Unit Ventilator	Cream	Room 108	3.60	Positive
1541	Plaster	Wall (C)	Cream	Room 108	0.26	Negative
1542	Metal	Radiator	Brown	Room 108	6.60	Positive
1543	Wood	Window Shelf Leg	White	Room 108	0.02	Negative
1544	Wood	Window Shelf	White	Room 108	0.01	Negative
1545	Wood	Baseboard	Brown	Room 108	9.90	Positive
1546	Plaster	Ceiling	Cream	Room 108	0.07	Negative
1547	Metal	Unit Ventilator	Cream	Room 106	3.30	Positive
1548	Plaster	Wall (C)	Cream	Room 106	12.70	Positive
1549	Metal	Radiator	Cream	Room 106	3.10	Positive
1550	Wood	Window Shelf Leg	Cream	Room 106	0.02	Negative
1551	Wood	Window Shelf	Cream	Room 106	0.00	Negative
1552	Wood	Baseboard	Brown	Room 106	5.80	Positive
1553	Plaster	Ceiling	Cream	Room 106	-0.22	Negative
1554	Plaster	Wall (C)	Cream	Room 104	-0.57	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1555	Metal	Radiator	Brown	Room 104	4.20	Positive
1556	Plaster	Baseboard	Black	Room 104	0.00	Negative
1557	Plaster	Ceiling	White	Room 104	0.05	Negative
1558	Metal	Unit Ventilator	Cream	Room 102	0.02	Negative
1559	Plaster	Wall (C)	Cream	Room 102	-0.42	Negative
1560	Metal	Radiator	Brown	Room 102	4.90	Positive
1561	Wood	Window Shelf	Cream	Room 102	0.05	Negative
1562	Wood	Baseboard	Black	Room 102	0.08	Negative
1563	Plaster	Ceiling	Cream	Room 102	0.09	Negative
1564	Metal	Unit Ventilator	Cream	Room 103	-0.48	Negative
1565	Plaster	Wall (C)	Cream	Room 103	0.05	Negative
1566	Metal	Radiator	Brown	Room 103	7.60	Positive
1567	Wood	Window Shelf	Cream	Room 103	0.02	Negative
1568	Wood	Baseboard	Brown	Room 103	0.16	Negative
1569	Plaster	Ceiling	Cream	Room 103	-0.57	Negative
1570	Metal	Unit Ventilator	Brown	Room 100	0.01	Negative
1571	Plaster	Wall (C)	Cream	Room 100	0.30	Negative
1572	Metal	Radiator	Yellow	Room 100	5.60	Positive
1573	Wood	Window Shelf	Brown	Room 100	0.08	Negative
1574	Wood	Baseboard	Brown	Room 100	0.20	Negative
1575	Plaster	Ceiling	Cream	Room 100	0.04	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1576	Metal	Unit Ventilator	White	Room 101	0.00	Negative
1577	Plaster	Wall (C)	Cream	Room 101	0.13	Negative
1578	Metal	Radiator	Brown	Room 101	4.50	Positive
1579	Wood	Window Shelf	Cream	Room 101	0.00	Negative
1580	Wood	Baseboard	Brown	Room 101	0.20	Negative
1581	Plaster	Ceiling	Cream	Room 101	0.08	Negative
1582	Metal	Unit Ventilator	Cream	Room 200	-0.40	Negative
1583	Plaster	Wall (C)	Cream	Room 200	-0.68	Negative
1584	Metal	Radiator	Brown	Room 200	0.80	Negative
1585	Wood	Window Shelf	Cream	Room 200	0.02	Negative
1586	Wood	Baseboard	Brown	Room 200	0.04	Negative
1587	Metal	Unit Ventilator	Cream	Room 201	0.09	Negative
1588	Plaster	Wall (C)	Cream	Room 201	-0.69	Negative
1589	Metal	Radiator	Brown	Room 201	0.60	Negative
1590	Wood	Window Shelf	Cream	Room 201	0.00	Negative
1591	Wood	Baseboard	Brown	Room 201	0.10	Negative
1592	Metal	Unit Ventilator	Cream	Room 203	-0.42	Negative
1593	Plaster	Wall (C)	Cream	Room 203	-0.59	Negative
1594	Metal	Radiator	Brown	Room 203	0.70	Negative
1595	Wood	Window Shelf	Cream	Room 203	0.01	Negative
1596	Wood	Baseboard	Brown	Room 203	0.05	Negative

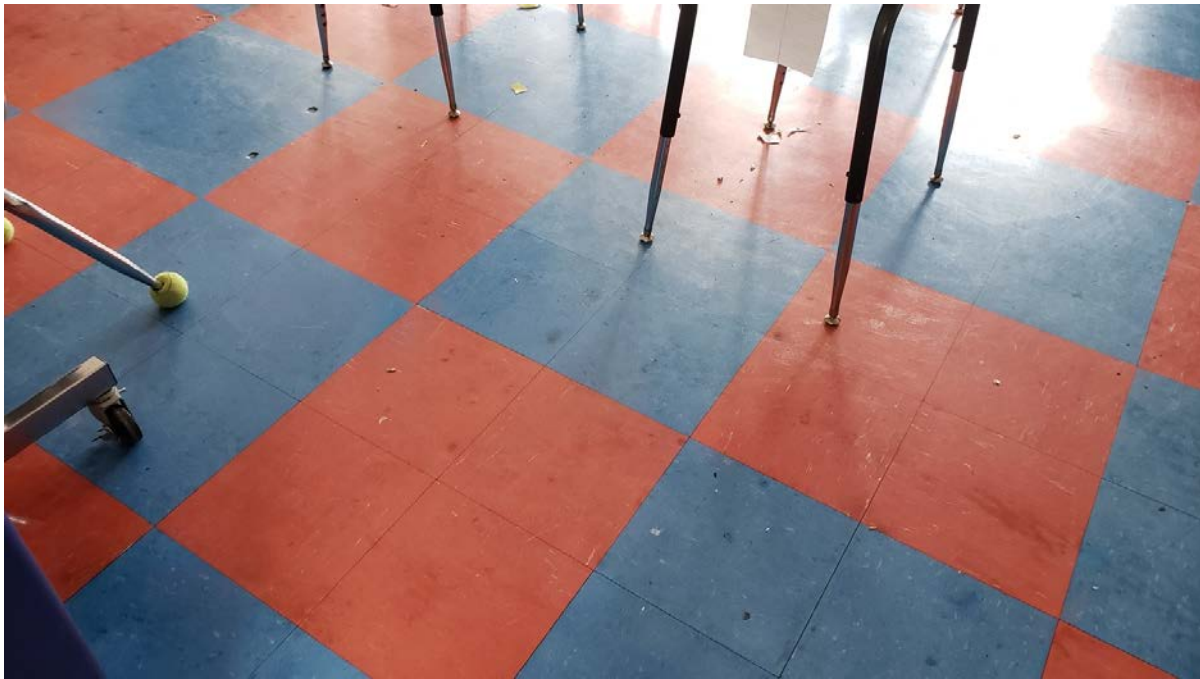
Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1597	Metal	Unit Ventilator	Cream	Room 202	0.68	Negative
1598	Plaster	Wall (C)	Cream	Room 202	0.09	Negative
1599	Metal	Radiator	Brown	Room 202	1.10	Positive
1600	Wood	Window Shelf	Cream	Room 202	0.00	Negative
1601	Wood	Baseboard	Brown	Room 202	0.18	Negative
1602	Metal	Unit Ventilator	Cream	Room 204	-0.79	Negative
1603	Plaster	Wall (C)	Cream	Room 204	12.20	Positive
1604	Metal	Radiator	Brown	Room 204	0.90	Negative
1605	Wood	Baseboard	Brown	Room 204	8.70	Positive
1606	Gypsum	Wall (D)	Cream	Room 204	0.00	Negative
1607	Metal	Unit Ventilator	Cream	Room 204A	-0.45	Negative
1608	Plaster	Wall (C)	Cream	Room 204A	9.20	Positive
1609	Wood	Radiator	Brown	Room 204A	8.20	Positive
1610	Gypsum	Wall (B)	Cream	Room 204A	0.00	Negative
1611	Metal	Unit Ventilator	Cream	Room 206	5.30	Positive
1612	Plaster	Wall (C)	Cream	Room 206	10.90	Positive
1613	Metal	Radiator	Brown	Room 206	2.50	Positive
1614	Wood	Window Shelf	Cream	Room 206	0.02	Negative
1615	Wood	Baseboard	Brown	Room 206	6.10	Positive
1616	Plaster	Wall (C)	Cream	Room 208	-0.77	Negative
1617	Metal	Radiator	Brown	Room 208	2.00	Positive

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1618	Wood	Window Shelf	Cream	Room 208	0.00	Negative
1619	Plaster	Baseboard	Black	Room 208	0.00	Negative
1620	Metal	Unit Ventilator	Cream	Library	7.60	Positive
1621	Plaster	Wall (C)	Cream	Library	11.70	Positive
1622	Metal	Radiator	Brown	Library	6.00	Positive
1623	Wood	Baseboard	Black	Library	10.10	Positive
1624	Metal	Unit Ventilator	Cream	Room 212	5.00	Positive
1625	Plaster	Wall (C)	Cream	Room 212	16.60	Positive
1626	Metal	Radiator	Brown	Room 212	6.50	Positive
1627	Wood	Window Shelf	Cream	Room 212	-0.59	Negative
1628	Wood	Baseboard	Brown	Room 212	6.90	Positive
1629	Metal	Unit Ventilator	Cream	Room 213	5.50	Positive
1630	Plaster	Wall (C)	Cream	Room 213	16.70	Positive
1631	Wood	Radiator Cover	Cream	Room 213	0.00	Negative
1632	Wood	Baseboard	Brown	Room 213	6.00	Positive
1633	Plaster	Wall (C)	Cream	Room 214	18.40	Positive
1634	Metal	Radiator	Brown	Room 214	3.80	Positive
1635	Wood	Window Shelf	Cream	Room 214	0.01	Negative
1636	Wood	Baseboard	Brown	Room 214	4.90	Positive
1637	-	-	-	Calibration Check	1.10	-
1638	-	-	-	Calibration Check	1.10	-

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
1639	-	-	-	Calibration Check	1.00	-

Appendix E

Photo Log



Asbestos containing 12"x12" Floor Tile, Blue & 12"x12" Floor Tile, Red. Mastic is non-asbestos containing.

Appendix F

Certifications

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Enviroscience Consultants, LLC

2150 Smithtown Avenue

Ronkonkoma, NY 11779

FILE NUMBER: 99-0882

LICENSE NUMBER: 28733

LICENSE CLASS: RESTRICTED

DATE OF ISSUE: 11/15/2021


EXPIRATION DATE: 11/30/2022

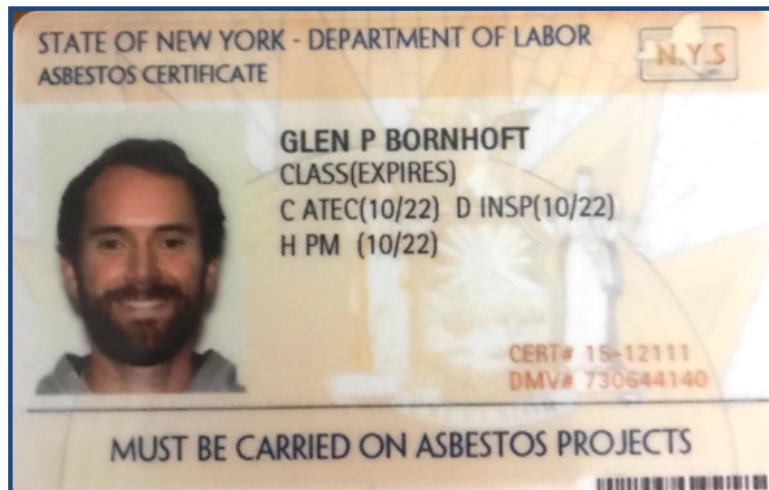
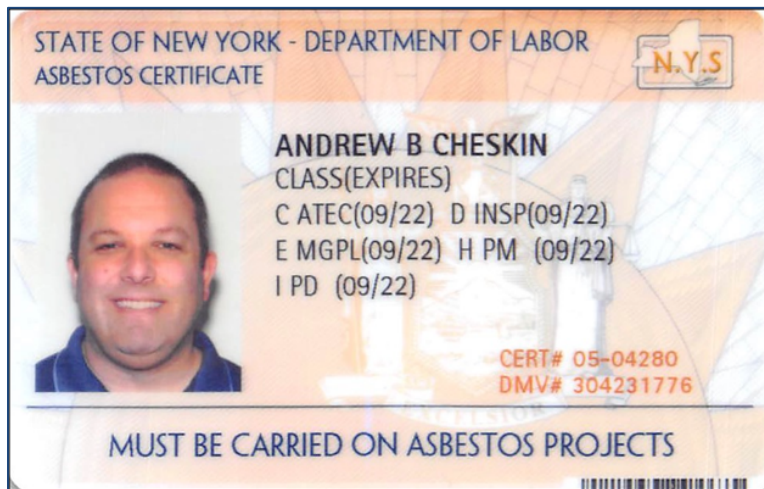
Duly Authorized Representative – Glenn Neuschwender:

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

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

SH 432 (8/12)


Amy Phillips, Director
For the Commissioner of Labor



United States Environmental Protection Agency

This is to certify that

Enviroscience Consultants, Inc.

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

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires May 28, 2022

LBP-1327-1

Certification #

January 29, 2019

Issued On



Michelle Price

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that

Andrew B Cheskin

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

Risk Assessor

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires August 06, 2024

LBP-R-11931-2

Certification #

August 02, 2021

Issued On



Ben Conetta

Ben Conetta, Chief

Chemicals and Multimedia Programs Branch

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2022
Issued April 01, 2021
Revised October 19, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. GLENN L. NEUSCHWENDER
ENVIROSCIENCE CONSULTANTS, LLC
2150 SMITHTOWN AVENUE SUITE 3
RONKONKOMA, NY 11779

NY Lab Id No: 11681

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

Miscellaneous

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



Serial No.: 63960

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

Page 1 of 1

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Enviroscience Consultants, LLC

2150 Smithtown Ave.
Suite 3
Ronkonkoma, NY 11779
Mr. Edward Detweiler
Phone: 631-580-3191 Fax: 631-580-3195
Email: edetweiler@envirohealth.org
<http://www.envirohealth.org>

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 200531-0

Bulk Asbestos Analysis

Code

Description

18/A01

EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

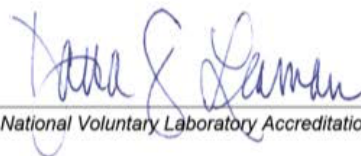
Airborne Asbestos Analysis

Code

Description

18/A02

U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



For the National Voluntary Laboratory Accreditation Program

Effective 2021-10-01 through 2022-09-30

Page 1 of 1

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200531-0

Enviroscience Consultants, LLC
Ronkonkoma, NY

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2021-10-18 through 2022-09-30
Effective Dates



[Signature]
For the National Voluntary Laboratory Accreditation Program

Limited Environmental Survey

**Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530**

**Woodside Middle High School
475 West Hartsdale Avenue
Hartsdale, NY 10530**

March 2022



2150 Smithtown Ave., Suite 3, Ronkonkoma, NY 11779

T: 631.580.3191 • **F:** 631.580.3195 • **W:** envirohealth.org

ASBESTOS & LEAD SURVEY REPORT

Woodside Middle High School

475 West Hartsdale Avenue

Hartsdale, NY 10530

March 2022

Enviroscience Project No. 21819

Prepared for: Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530

Prepared by: ENVIROSCIENCE CONSULTANTS, LLC.
2150 Smithtown Avenue
Ronkonkoma, NY 11779
(631) 580-3191

37 Moore Avenue
Mount Kisco, NY 10549
(914) 864-1699

Asbestos / Lead Inspector: Drew Cheskin
Drew Cheskin
NYS Asbestos Certificate: 05-04280
NYS/EPA Lead Risk Assessor: LBP-R-11931-1

Asbestos / Lead Inspector: Glen Bornhoft
Glen Bornhoft
NYS Asbestos Certificate: 15-12111

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3.2	Lead Sampling Results

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Appendix B	Asbestos Bulk Sample Location Drawings
Appendix C	Asbestos Containing Materials Location Drawings
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Appendix E	Photo Log
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1.0 EXECUTIVE SUMMARY

Greenburgh Central School District retained Enviroscience Consultants, LLC. to conduct a limited asbestos & lead survey at Woodside Middle High School, 475 West Hartsdale Avenue, Hartsdale, New York. The purpose of this survey was to identify and quantify asbestos containing materials (ACM) & Lead-based paint (LBP) that may be affected by proposed renovations within the building.

The survey was performed on January 24th, 26th, 27th & February 1st, 2022, and based upon written and verbal communications with Jim Weydig of BBS Architects (BBS). Floor plans with highlighted areas were provided, but no architectural, renovation, demolition or proposed construction plans were provided, and no comprehensive written scope of work was available at the time of the survey. As a result, the survey consisted of inspecting the highlighted areas of the provided floor plans, and with the guidance from BBS, sampling or testing accessible materials for asbestos or lead content. No destructive or invasive measures were used to identify or sample materials, and live electrical and operating mechanical systems were not accessed for inspection. Upon receipt of finalized architectural drawings, additional sampling may be required.

Asbestos

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials **contain asbestos** (greater than 1-percent);

- *Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**
- *Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)*
- *Duct Insulation (Cafeteria Mechanical Room 1)*

** Testing of this material for subsequent projects, in different test locations, returned a positive result for asbestos.*

Material will be treated as asbestos for the purposes of this project.

The following materials were not sampled, but are **presumed to contain asbestos** (greater than 1-percent) based on historical testing of similar materials;

- None

For each survey conducted, the inspector classifies ACM or Assumed ACM materials by friability and condition. This helps to determine the extent of damage in certain areas as well as the potential for further damage and Asbestos release due to disturbance of the material.

Material Location	Material	Quantity*	Friability	Condition
Kitchen Mechanical Room & Storage	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 40 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
Large Gymnasium HVAC, Left	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 20 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
Large Gymnasium HVAC, Right	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 22 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
Small Gymnasium HVAC, Left	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 30 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
Boys Locker Room Mechanical Space & Storage	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 75 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
HVAC Room 117A	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 40 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
Cafeteria Mechanical Room #1 (over "Taco Stand")	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 60 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
	Duct Insulation	135 SF	Yes	Good
Cafeteria Mechanical Room #2 (over stairs to kitchen)	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 60 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
Art Section Slop Sink Closet	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 8 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good
Art Section Kiln Closet	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 7 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good

HVAC Room 311	<i>Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)**</i>	Approx. 50 Elbows	Yes	Good
	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap (Mechanical Rooms)		Yes	Good

* All quantities in this assessment are estimations. An abatement contractor should perform a site walk through and calculate quantities prior to submitting a proposal.

** Testing of this material for subsequent projects, in different test locations, returned a positive result for asbestos. Material will be treated as asbestos for the purposes of this project.

Condition Definitions:

Good: None/Minimal apparent damage to ACM

Fair: Up to 10% localized damage or up to 25% of the entire ACM is damaged

Poor: Over 10% localized damage or over 25% of the entire ACM is damaged

Asbestos-containing materials (ACM) may only be removed or disturbed by a certified and licensed asbestos abatement contractor. Project monitoring for asbestos abatement projects by an independent air-monitoring firm under contract of the Owner is required, with air sampling being required for most projects. All other materials tested negative for asbestos.

Lead

An EPA certified lead risk assessor used an X-ray Fluorescence (XRF) analyzer to inspect the building in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision. OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount.

The following surfaces were identified with lead levels above the HUD Guideline definition of greater than 1.0 milligram per square centimeter (mg/cm²):

- None

A full list of components sampled as part of the Lead-based Paint Survey is included in Section 3.0.

2.0 ASBESTOS SURVEY

2.1 Asbestos Survey Procedures

The asbestos survey was designed to meet all requirements specified in the *NYS Asbestos Code Rule, 12 NYCRR Part 56, Subpart 56-5.1 Asbestos Survey Requirements for Building/Structure Demolition, Renovation, Remodeling and Repair*. The asbestos survey was conducted by New York State certified asbestos inspectors. Sample analysis was performed by Enviroscience Consultants, LLC., a New York State Department of Health Environmental Laboratory Approval Program accredited laboratory.

New York State requires that the asbestos survey information be transmitted by the building owner as follows:

- One copy of the completed asbestos survey shall be sent by the owner or their agent to the local government entity charged with issuing a permit for such demolition, renovation, remodeling or repair work under applicable State or local laws.
- The completed asbestos survey for controlled demolition or pre-demolition asbestos projects shall also be submitted to the appropriate Asbestos Control Bureau district office.
- The completed asbestos survey shall be kept on the construction site with the asbestos notification and variance, if required, throughout the duration of the asbestos project and any associated demolition, renovation, remodeling or repair project.

Enviroscience performed a site investigation of target areas within the building that included a visual inspection of all accessible areas designated for renovation. Material systems were assigned into groups of homogeneous materials. A homogeneous material is defined as a material that is alike in color and texture that was installed at the same time. Samples were then collected from each homogeneous area according to USEPA AHERA requirements. Based upon sample results, each sampled homogeneous area was classified as either asbestos or non-asbestos containing. An asbestos containing material is defined by the USEPA as a material containing greater than one percent asbestos by weight.

New York State certified Asbestos Inspector Drew Cheskin (cert. #05-04280) and New York State certified Asbestos Inspector Glen Bornhoft (cert. #15-12111) conducted the survey on January 24th, 26th, 27th & February 1st, 2022. Certifications are provided in Appendix F. The inspectors entered all accessible areas to identify and sample suspect asbestos containing materials. Please reference Asbestos Bulk Sample Location Drawings in Appendix B. Asbestos-containing materials (ACM) are noted above in the Executive Summary and in this section. Also reference the Asbestos Bulk Sample Results in Appendix A and Asbestos Containing Materials Location Drawings in Appendix C.

Photographs in Appendix E are typical and do not show all of the asbestos materials that they represent.

Any asbestos containing materials that will be disturbed during renovation or demolition must be removed by a New York State certified and licensed asbestos abatement contractor. Air monitoring is required for most asbestos projects.

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials are **classified as non-asbestos containing** (less than or equal to 1-percent) and may be removed or disturbed as regular construction materials:

- Canvas Wrap to Fiberglass Pipe Insulation (Mechanical Rooms)
- Elbows to Fiberglass Pipe Insulation with Canvas Wrap (Mechanical Rooms)
- Tar Containing Wrap to Fiberglass Pipe Insulation (Mechanical Rooms)
- Duct Vibration Dampener (Mechanical Rooms)
- Ceiling Plaster, Scratch Coat (no finish coat observed) (1st Floor HVAC Room 117A)
- Wall Plaster, Scratch Coat (no finish coat observed) (1st Floor HVAC Room 117A)
- Tectum Ceiling/Roof Deck (Throughout)
- CMU Mortar (Throughout)
- Gypsum Board (206A, 306, 310)
- Joint Tape (206A, 306, 310)
- Joint Compound (206A, 306, 310)
- 2'x4' Ceiling Tile (Art Wing Office B)
- 2'x4' Ceiling Tile, Type 1 (Package/File Room @ Auditorium Entrance)
- 2'x4' Ceiling Tile, Type 2 (Package/File Room @ Auditorium Entrance)
- 2'x4' Ceiling Tile (Principal's Office 206A)

Refer to the Bulk Sample Results #32170 for detailed sample information.

The following materials are **classified as non-suspect** (not considered suspect asbestos containing materials by EPA or NYS DOL) and may be removed or disturbed as regular construction materials:

- Brick
- CMU
- Concrete
- Fiberglass Pipe Insulation w/Hard Fiberglass Elbows
- Rubber/Vinyl Wire Insulation
- Stone

The following **locations were not inspected** due to inaccessibility, the destructive nature of the testing and inability to repair the building component, live electrical or active mechanical components, or by directive of the client. Should work in these areas reveal previously un-sampled suspect asbestos containing materials, these materials must be **assumed asbestos containing** and all activities in the area(s) must stop immediately until proper sample collection and laboratory analysis has been performed:

- No exterior materials were sampled
- No penetrations into exterior walls were made
- Interiors of air handlers/duct work systems
- Interiors of furnaces

2.2 Asbestos Sampling Procedures

Samples of suspect asbestos materials were collected in accordance with United States Environmental Protection Agency guidelines as outlined below. These sampling procedures were implemented in an effort to minimize the release of asbestos fibers during sampling and to provide control of samples through analysis and reporting.

- Samples were collected in unoccupied areas.
- Surfaces of the material to be sampled were wetted with water mist prior to collection.
- Samples were collected with a cork borer, knife, or other approved sampling tool.

- Sampling tools were decontaminated between each sample.
- Individual sealable containers were used to contain each of the collected samples.
- Samples were double-bagged for transportation to the laboratory.
- Sample containers were labeled with a date and unique sample ID number using a permanent marker.

At the completion of sampling activities, bulk samples were relinquished to the laboratory for analysis. Enviroscience Consultants, LLC. is a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program accredited environmental testing laboratory (ELAP #11681). The laboratory is also accredited by the National Voluntary Laboratory Accreditation Program, (NVLAP Lab Code 200531-0).

All asbestos bulk samples were analyzed by Polarized Light Microscopy (PLM). Samples of cellulose ceiling tiles, and non-friable organically bound (NOB) materials such as floor tiles and roofing material, that were found to contain less than 1% asbestos by PLM were then analyzed using Transmission Electron Microscopy (TEM). According to the Department of Health, NOB materials may first be analyzed by PLM. If asbestos is not found using PLM, the sample must be analyzed with the higher-powered transmission electron microscope.

3.0 LEAD-BASED PAINT INSPECTION

3.1 Lead Inspection Procedures

Enviroscience Consultants, LLC. conducted a limited Lead-based Paint Inspection throughout select interior locations of Woodside Middle High School. The purpose of the limited Lead-based Paint Inspection was to identify surfaces and building components which may be coated with lead-based paint. An EPA certified lead inspector/risk assessor used an X-ray Fluorescence (XRF) analyzer to test building components in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision.

3.2 Lead Sampling Results

Tested components and surfaces include:

- Metal, Air Handler, Gray, Kitchen Mechanical Room
- Metal, Transformer, Gray, Kitchen Mechanical Room

- Metal, Pipes, Blue, Kitchen Mechanical Room
- Metal, Breaker Box, Gray, Kitchen Mechanical Room
- Metal, Roof Ladder, Black, Cafeteria Mechanical Room I
- Metal, Air Handler, Gray, Cafeteria Mechanical Room I
- Metal, Ceiling Joist, Bl, Cafeteria Mechanical Room I
- Metal, Hatch to Room, Gray, Cafeteria Mechanical Room I
- Metal, Hatch Frame, Red, Cafeteria Mechanical Room I
- CMU, Wall (A), Gray, Room 306A
- Gypsum, Wall (A), Gray, Room 306A
- Metal, Door Frame, Light Blue, Room 306A
- Wood, Door Frame, Light Blue, Room 306A (to 306B)
- Gypsum, Wall (C), Gray, Room 306A
- Wood, Chase, Gray, Room 306A (on wall D)
- Gypsum, Wall (A), Gray, Room 306B
- Gypsum, Wall (B), Gray, Room 306B
- Metal, Chase, Gray, Room 306B (@ window)
- Gypsum, Wall (D), Gray, Room 306B
- Wood, Chase, Gray, Room 306B (on wall D)
- Gypsum, Wall (A), Gray, Room 306C
- CMU, Wall (B), Gray, Room 306C
- CMU, Wall (C), Gray, Room 306C
- Wood, Trim, Gray, Room 306C (on wall D)
- Wood, Door Frame, Light Blue, Room 306C (to 306D)
- Gypsum, Wall (A), Gray, Room 306D
- CMU, Wall (B), Gray, Room 306D
- Metal, Partition, Gray, Room 310 - Secretary (on wall A)
- Gypsum, Wall (B), Gray, Room 310 - Secretary
- Concrete, Column, Gray, Room 310 - Secretary (@ window)
- Wood, Wall (D), Gray, Room 310 - Secretary
- CMU, Wall (D), Gray, Room 310 - Secretary
- Metal, Ceiling Tile, Gray, Room 310 - Secretary
- Metal, Partition, Gray, Room 310 - Conference (to storage)
- Gypsum, Wall (D), Gray, Room 310 - Conference
- CMU, Wall (C), Gray, Room 310 - Conference
- CMU, Wall (C), Gray, Room 310 - Storage
- Gypsum, Wall (A), Gray, Room 310 - Office
- CMU, Wall (C), Gray, Room 310 - Office
- CMU, Wall (B), Aqua, 3rd Floor HVAC
- Metal, Air Handler, White, 3rd Floor HVAC
- Metal, Window Panel, Aqua, 3rd Floor HVAC
- Wood, Chase, Aqua, 3rd Floor HVAC (@ window)
- Metal, Ceiling Joist, Beige, 3rd Floor HVAC
- Gypsum, Wall (A), Salmon, Room 206A - Storage

- Metal, Door Frame, Salmon, Room 206A - Storage
- Wood, Panel, Salmon, Room 206A - Storage (@ window)
- Metal, Chase, Salmon, Room 206A - Storage (@ window)
- Gypsum, Wall (C), Salmon, Room 206A - Storage
- Wood, Chase, Salmon, Room 206A - Storage (@ ceiling/wall C)
- Gypsum, Wall (C), Pink, Room 206A - Vestibule
- Metal, Door Frame, Black, Room 206A - Vestibule (to office)
- Wood, Door, Black, Room 206A - Vestibule (to office)
- Gypsum, Wall (B), Pink, Room 206A - Office
- Gypsum, Wall (D), Pink, Room 206A - Office
- Gypsum, Wall (A), Gray, Room 206A - Conference Room
- Gypsum, Wall (C), Gray, Room 206A - Conference Room
- Gypsum, Wall (D), Gray, Room 206A - Conference Room
- Metal, Door Frame, Black, Room 206A - Conference Room (to Principal)
- Wood, Door, Black, Room 206A - Conference Room (to Principal)
- Metal, Spline Ceiling, Gray, Room 206A - Conference Room
- Gypsum, Wall (A), Cream, Room 206A - Principal
- Gypsum, Wall (C), Cream, Room 206A - Principal
- CMU, Wall (D), Cream, Room 206A - Principal
- Metal, Hangers, Black, Room 206A - Principal (above 2"x4" CT)
- Metal, Door Frame, Yellow, 1st Floor - HVAC 117A
- CMU, Wall (A), Light Blue, 1st Floor - HVAC 117A
- CMU, Wall (B), Light Blue, 1st Floor - HVAC 117A
- Cement, Wall (C), Light Blue, 1st Floor - HVAC 117A
- CMU, Wall (D), Light Blue, 1st Floor - HVAC 117A
- Metal, Pipes, Light Blue, 1st Floor - HVAC 117A
- Metal, Conduit, Light Blue, 1st Floor - HVAC 117A
- Metal, Air Handler, White, 1st Floor - HVAC 117A
- Metal, Air Handler, Gray, 1st Floor - HVAC 117A
- Metal, Duct Work, White, 1st Floor - HVAC 117A
- Metal, Breaker Box, Gray, 1st Floor - HVAC 117A
- Plaster, Ceiling, White, 1st Floor - HVAC 117A
- Metal, Conduit, White, 1st Floor - HVAC 117A
- Metal, Window Frame, Gray, Guidance - Mail Room
- Wood, Window Stool, Gray, Guidance - Mail Room
- Particle Board, Wall (D), Gray, Guidance - Mail Room
- Metal, Window Frame, Gray, Guidance - News & Postings Room
- Wood, Window Stool, Gray, Guidance - News & Postings Room
- Particle Board, Wall (D), Gray, Guidance - News & Postings Room
- Metal, Window Frame, Gray, Guidance - Copy Room
- Wood, Window Stool, Gray, Guidance - Copy Room
- Particle Board, Wall (D), Gray, Guidance - Copy Room
- Metal, Door Partition, Green, Guidance - Main Entry

- Particle Board, Wall (A), White, Guidance - Main Entry
- Metal, Chase, White, Guidance - Main Entry
- Metal, Window Frame, Yellow, Guidance - First Office
- Wood, Window Stool, Yellow, Guidance - First Office
- Particle Board, Wall (C), Cream, Guidance - First Office
- Metal, Window Frame, Cream, Guidance - Storage
- Wood, Window Stool, Cream, Guidance - Storage
- Particle Board, Wall (C), Cream, Guidance - Storage
- Metal, Window Frame, Aqua, Guidance - Second Office
- Wood, Window Stool, Aqua, Guidance - Second Office
- Particle Board, Wall (C), Aqua, Guidance - Second Office
- Wood, Door, White, Art Wing - Office A
- Metal, Door Frame, White, Art Wing - Office A
- CMU, Wall (B), White, Art Wing - Office A
- Gypsum, Wall (C), White, Art Wing - Office A
- Wood, Door, Green, Art Wing - Office A
- Metal, Door Frame, Green, Art Wing - Office A
- Wood, Door, White, Art Wing - Office B
- Metal, Door Frame, White, Art Wing - Office B
- CMU, Wall (B), White, Art Wing - Office B
- Gypsum, Wall (C), Gray, Art Wing - Office B
- CMU, Wall (D), Gray, Art Wing - Office B
- Metal, Ceiling Hatch, Gray, Art Wing - Office B
- Wood, Door, Green, Art Wing - Office B
- Metal, Door Frame, Green, Art Wing - Office B
- Metal, Door Frame, White, Art Wing - Kiln Room
- CMU, Wall (B), White, Art Wing - Kiln Room
- Metal, Ladder, Yellow, Art Wing - Kiln Room
- Wood, Door, Green, Art Wing - Kiln Room
- Metal, Door Frame, Green, Art Wing - Kiln Room
- Metal, Door Frame, Yellow, Art Wing - Slop Sink Closet
- CMU, Wall (B), Gray, Art Wing - Slop Sink Closet
- Metal, Hatch, Gray, Art Wing - Slop Sink Closet
- CMU, Wall (C), Cream, Art Wing - Slop Sink Closet
- Metal, Breaker Box, Gray, Art Wing - Slop Sink Closet
- Metal, Transformer, Gray, Art Wing - Slop Sink Closet
- Concrete, Floor, Red, Art Wing - Slop Sink Closet
- Metal, Electrical Box, Green, Art Wing - Slop Sink Closet
- Metal, Door Frame, Green, Package/File Room
- CMU, Wall (A), Cream, Package/File Room
- CMU, Wall (C), Cream, Package/File Room
- Metal, Conduit, Cream, Package/File Room
- Metal, Hatch to Room, Gray, Cafeteria Mechanical Room II

- Metal, Hatch Frame, Red, Cafeteria Mechanical Room II
- Metal, Ceiling Joist, Beige, Gym Wing - Boy's Locker Storage
- Metal, Roof Hatch Frame, Beige, Gym Wing - Boy's Locker Storage
- Metal, Ladder, Brown, Gym Wing - Boy's Locker Storage
- CMU, Wall (A), White, Gym Wing - Boy's Locker Storage
- CMU, Wall (A), Green, Gym Wing - Boy's Locker Storage
- Metal, Duct Work, Beige, Gym Wing - Boy's Locker Mechanical Room
- Metal, Ceiling Joist, Beige, Gym Wing - Boy's Locker Mechanical Room
- Metal, Door Frame, Tan, Gym Wing - Boy's Locker Mechanical Room
- Metal, Breaker Box, Gray, Gym Wing - Boy's Locker Mechanical Room
- Metal, Door Lintel, Beige, Small Gym - Right HVAC Room
- Metal, Door Frame, Beige, Small Gym - Right HVAC Room
- Metal, Door Lintel, Beige, Small Gym - Left HVAC Room
- Metal, Door Frame, Beige, Small Gym - Left HVAC Room
- Metal, Door Lintel, Beige, Large Gym - Right HVAC Room
- Metal, Door Frame, Beige, Large Gym - Right HVAC Room
- Metal, Door, Gray, Large Gym - Right HVAC Room
- Metal, Door Lintel, Beige, Large Gym - Left HVAC Room
- Metal, Door Frame, Green, Large Gym - Left HVAC Room
- Metal, Door, Green, Large Gym - Left HVAC Room

Lead amounts greater than or equal to 1.0 mg/cm² have been identified in the components listed below:

- None

All other surfaces and components tested for lead-based paint were below 1.0 mg/cm². All workers involved in construction and demolition activities are covered under The OSHA Lead Exposure in Construction Rule (29 CFR 1926.62). OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount. This standard requires workers to be trained and protected from lead exposure by use of engineering controls, respiratory protection, protective clothing and medical surveillance when airborne concentration of lead exceed established personal exposure limit (PEL) levels.

Complete Lead XRF Results are located in Appendix D.

Please reference Enviroscience Consultants, LLC. certifications in Appendix F.

Appendix A
Asbestos Bulk Sample Results

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/1/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/3/2022
JOB #:	21819	AREA:	Woodlands Middle High School
PAGE #:	1 of 8	SAMPLER:	Drew Cheskin
		CUSTODY #:	32170

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
01-01	Canvas Wrap to Fiberglass Pipe Insulation	Beige/Tan	Cafeteria Mechanical Room I	None Detected		95.0% cellulose	5.0% binders
01-02	Canvas Wrap to Fiberglass Pipe Insulation	Beige/Tan	Cafeteria Mechanical Room II	None Detected		95.0% cellulose	5.0% binders
01-03	Canvas Wrap to Fiberglass Pipe Insulation	Beige/Tan	Gym Wing Boys Locker Room Mechanical Room	None Detected		95.0% cellulose	5.0% binders
02-04	Elbows to Fiberglass Pipe Insulation with Canvas Wrap	Gray	Cafeteria Mechanical Room I	None Detected		50.0% mineral wool 15.0% cellulose	35.0% binders
02-05	Elbows to Fiberglass Pipe Insulation with Canvas Wrap	Gray	Cafeteria Mechanical Room II	None Detected		60.0% mineral wool 10.0% cellulose	30.0% binders
02-06	Elbows to Fiberglass Pipe Insulation with Canvas Wrap	Gray	Gym Wing Boys Locker Room Mechanical Room	None Detected		60.0% mineral wool 10.0% cellulose	30.0% binders
02-07	Elbows to Fiberglass Pipe Insulation with Canvas Wrap	Gray	1st Floor HVAC 117A	None Detected		60.0% mineral wool 10.0% cellulose	30.0% binders

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by: John A. Spillitto Date Analyzed: 2/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/1/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/3/2022
JOB #:	21819	AREA:	Woodlands Middle High School
PAGE #:	2 of 8	SAMPLER:	Drew Cheskin
		CUSTODY #:	32170

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
02-08	Elbows to Fiberglass Pipe Insulation with Canvas Wrap	Gray	1st Floor HVAC 117A	None Detected		60.0% mineral wool 10.0% cellulose	30.0% binders
03-09	Tar Containing Wrap to Fiberglass Pipe Insulation	Tan w/Black	Art Wing Kiln Room	None Detected by TEM		None Detected	89.8% organics and carbonates 10.2% silicates and opaques
03-10	Tar Containing Wrap to Fiberglass Pipe Insulation	Tan w/Black	Small Gymnasium HVAC Room, Right	None Detected by TEM		None Detected	96.7% organics and carbonates 3.3% silicates and opaques
03-11	Tar Containing Wrap to Fiberglass Pipe Insulation	Tan w/Black	Large Gymnasium HVAC Room, Left	None Detected by TEM		None Detected	99.0% organics and carbonates 1.0% silicates and opaques
04-12	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap	Gray	Art Wing Kiln Room	57.1% Asbestos	57.1 % Chrysotile	14.3% cellulose	28.6% binders
04-13	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap	Gray	Small Gymnasium HVAC Room, Right	66.7% Asbestos	66.7% Chrysotile	16.7% cellulose	16.6% binders
04-14	Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap	Gray	Large Gymnasium HVAC Room, Left	57.1% Asbestos	57.1% Chrysotile	14.3% cellulose	28.6% binders

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by:  Date Analyzed: 2/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/1/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/3/2022
JOB #:	21819	AREA:	Woodlands Middle High School
PAGE #:	3 of 8	SAMPLER:	Drew Cheskin
		CUSTODY #:	32170

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
05-15	Duct Vibration Dampener	Green	Cafeteria Mechanical Room	None Detected		90.0% cellulose	10.0% binders
05-16	Duct Vibration Dampener	Green	Cafeteria Mechanical Room	None Detected		90.0% cellulose	10.0% binders
05-17	Duct Vibration Dampener	Green	3rd Floor HVAC Room	None Detected		90.0% cellulose	10.0% binders
06-18	Duct Insulation	Gray	Cafeteria Mechanical Room	57.1% Asbestos	57.1% Chrysotile	14.3% cellulose	28.6% binders
06-19	Duct Insulation	Gray	Cafeteria Mechanical Room	57.1% Asbestos	57.1% Chrysotile	14.3% cellulose	28.6% binders
06-20	Duct Insulation	Gray	Cafeteria Mechanical Room	57.1% Asbestos	57.1% Chrysotile	14.3% cellulose	28.6% binders
07-21	Ceiling Plaster, scratch coat	Gray	1st Floor HVAC 117A	None Detected		3.0% cellulose	97.0% cement

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by: John A. Spillitto Date Analyzed: 2/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/1/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/3/2022
JOB #:	21819	AREA:	Woodlands Middle High School
PAGE #:	4 of 8	SAMPLER:	Drew Cheskin
		CUSTODY #:	32170

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
07-22	Ceiling Plaster, scratch coat	Gray	1st Floor HVAC 117A	None Detected		3.0% cellulose	97.0% cement
07-23	Ceiling Plaster, scratch coat	Gray	1st Floor HVAC 117A	None Detected		3.0% cellulose	97.0% cement
08-24	Wall Plaster, scratch coat	Gray	1st Floor HVAC 117A	None Detected		3.0% cellulose	97.0% cement
08-25	Wall Plaster, scratch coat	Gray	1st Floor HVAC 117A	None Detected		3.0% cellulose	97.0% cement
08-26	Wall Plaster, scratch coat	Gray	1st Floor HVAC 117A	None Detected		3.0% cellulose	97.0% cement
09-27	Tectum Ceiling/Roof Deck	Cream	Cafeteria Mechanical Room I	None Detected		75.0% cellulose	25.0% binders
09-28	Tectum Ceiling/Roof Deck	Cream	Cafeteria Mechanical Room II	None Detected		75.0% cellulose	25.0% binders

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by: John F. Spillitto Date Analyzed: 2/8/2022

ELAP # 11681; NVLAP Lab Code 200531-0

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/1/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/3/2022
JOB #:	21819	AREA:	Woodlands Middle High School
PAGE #:	5 of 8	SAMPLER:	Drew Cheskin
		CUSTODY #:	32170

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
09-29	Tectum Ceiling/Roof Deck	Cream	3rd Floor HVAC Room	None Detected		75.0% cellulose	25.0% binders
10-30	CMU Mortar	Gray	Kitchen Mechanical Room	None Detected		3.0% cellulose	97.0% cement
10-31	CMU Mortar	Gray	Cafeteria Mechanical Room	None Detected		3.0% cellulose	97.0% cement
10-32	CMU Mortar	Gray	Art Wing Slop Sink Closet	None Detected		3.0% cellulose	97.0% cement
10-33	CMU Mortar	Gray	Small Gymnasium HVAC Room, Left	None Detected		3.0% cellulose	97.0% cement
10-34	CMU Mortar	Gray	Large Gymnasium HVAC Room, Right	None Detected		3.0% cellulose	97.0% cement
11-35	Gypsum Board	Gray	Suite 206A	None Detected		20.0% cellulose	80.0% plaster

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by: John F. Spillitto Date Analyzed: 2/8/2022

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ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/1/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/3/2022
JOB #:	21819	AREA:	Woodlands Middle High School
PAGE #:	6 of 8	SAMPLER:	Drew Cheskin
		CUSTODY #:	32170

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
11-36	Gypsum Board	Gray	Suite 206A	None Detected		20.0% cellulose	80.0% plaster
12-37	Joint Tape	White	Suite 206A	None Detected		90.0% cellulose	10.0% binders
12-38	Joint Tape	White	Suite 206A	None Detected		90.0% cellulose	10.0% binders
13-39	Gypsum Board	Gray	Room 306	None Detected		20.0% cellulose	80.0% plaster
13-40	Gypsum Board	Gray	Room 310	None Detected		20.0% cellulose	80.0% plaster
14-41	Joint Compound	White	Room 306	None Detected		None Detected	75.4% organics and carbonates 24.6% silicates and opaques
14-42	Joint Compound	White	Room 306	None Detected		None Detected	81.2% organics and carbonates 18.8% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by: John F. Spillitto Date Analyzed: 2/8/2022

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ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/1/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/3/2022
JOB #:	21819	AREA:	Woodlands Middle High School
PAGE #:	7 of 8	SAMPLER:	Drew Cheskin
		CUSTODY #:	32170

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
14-43	Joint Compound	White	Room 310	None Detected		None Detected	72.5% organics and carbonates 27.5% silicates and opaques
15-44	Gypsum Board	Gray	Kitchen Mechanical Room	None Detected		20.0% cellulose	80.0% plaster
15-45	Gypsum Board	Gray	Kitchen Mechanical Room	None Detected		20.0% cellulose	80.0% plaster
16-46	2'x4' Ceiling Tile	White	Art Wing Office B	None Detected by TEM		31.9% mineral wool	36.2% organics and carbonates 31.9% silicates and opaques
16-47	2'x4' Ceiling Tile	White	Art Wing Office B	None Detected by TEM		32.6% mineral wool	34.8% organics and carbonates 32.6% silicates and opaques
17-48	2'x4' Ceiling Tile, Type I	White	Package/File Room @ Auditorium Entrance	None Detected by TEM		37.2% mineral wool	25.7% organics and carbonates 37.1% silicates and opaques
17-49	2'x4' Ceiling Tile, Type I	White	Package/File Room @ Auditorium Entrance	None Detected by TEM		38.1% mineral wool	23.8% organics and carbonates 38.1% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

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None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

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ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	2/1/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	2/3/2022
JOB #:	21819	AREA:	Woodlands Middle High School
PAGE #:	8 of 8	SAMPLER:	Drew Cheskin
		CUSTODY #:	32170

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
18-50	2'x4' Ceiling Tile, Type II	White	Package/File Room @ Auditorium Entrance	None Detected by TEM		32.2% mineral wool	35.7% organics and carbonates 32.1% silicates and opaques
18-51	2'x4' Ceiling Tile, Type II	White	Package/File Room @ Auditorium Entrance	None Detected by TEM		32.9% mineral wool	34.3% organics and carbonates 32.8% silicates and opaques
19-52	2'x4' Ceiling Tile	White	Principal's Office 206A	None Detected by TEM		35.3% mineral wool	29.3% organics and carbonates 35.4% silicates and opaques
19-53	2'x4' Ceiling Tile	White	Principal's Office 206A	None Detected by TEM		35.5% mineral wool	29.1% organics and carbonates 35.4% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

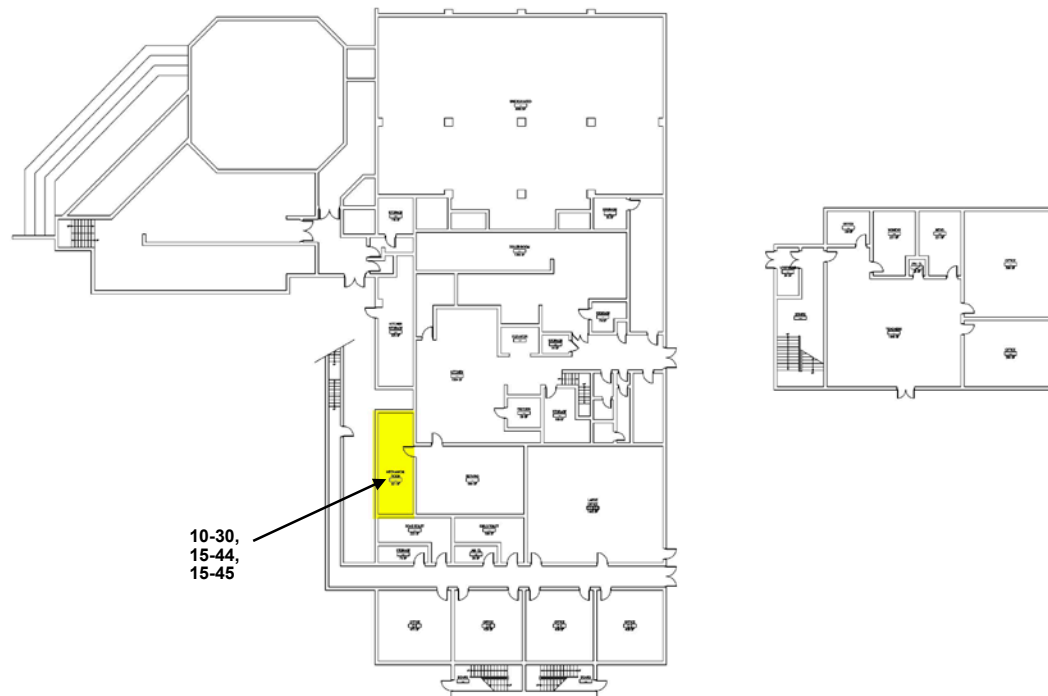
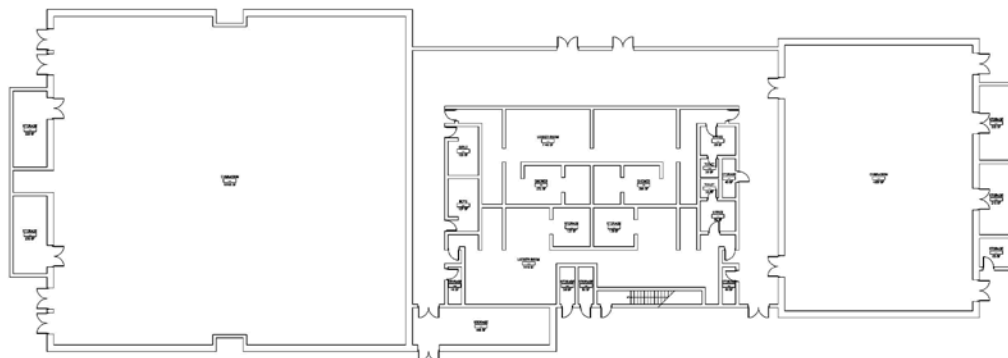
Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by: John F. Spillitto Date Analyzed: 2/8/2022

Appendix B
Asbestos Bulk Sample Location Drawings

**WOODLANDS MIDDLE/HIGH SCHOOL
GROUND FLOOR**



10-30,
15-44,
15-45



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FAX 580-3195
www.envirohealth.org

KEY PLAN
NO SCALE

PROJECT

**DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS**

CLIENT

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

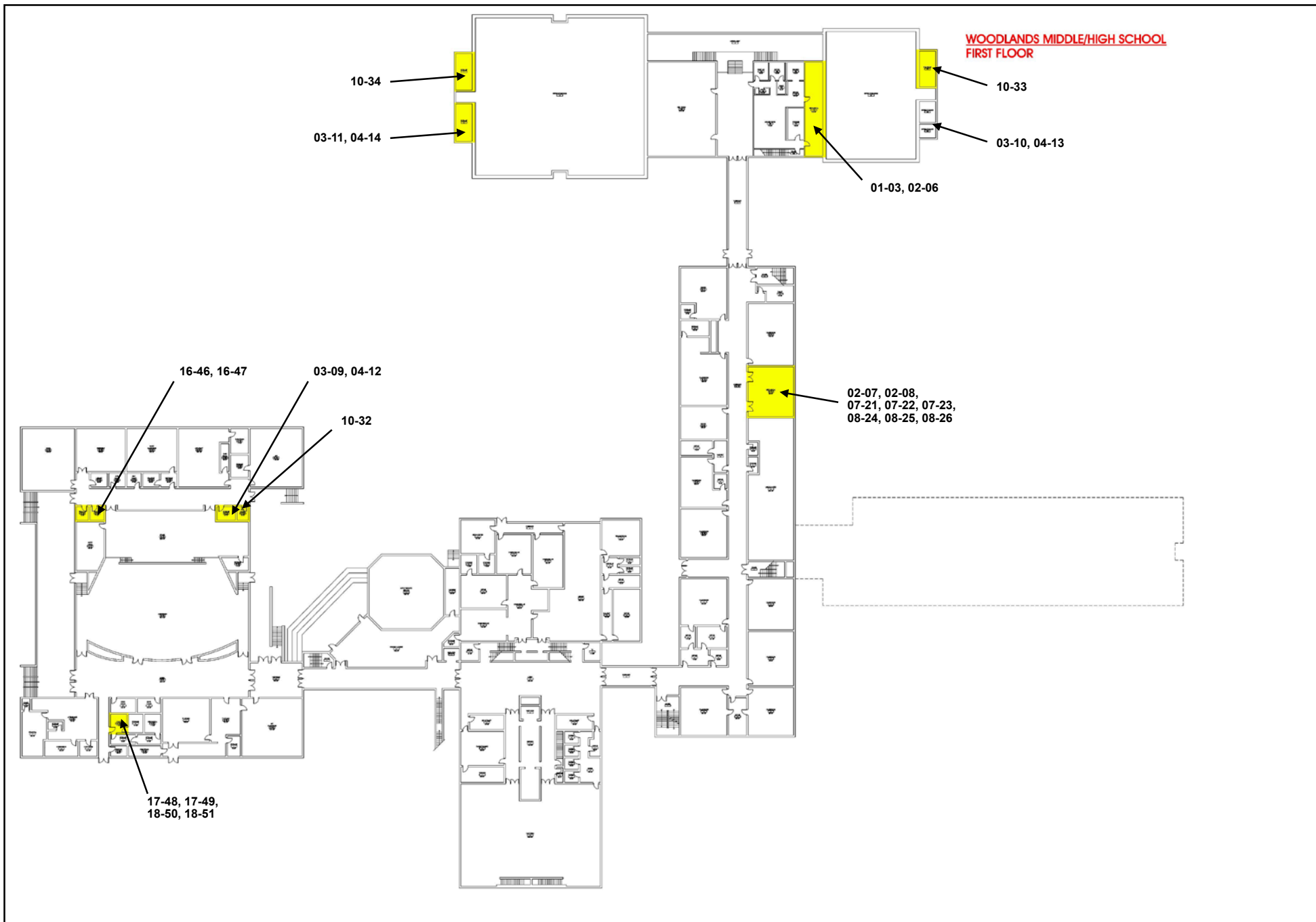
COMMENTS:
WOODSIDE MIDDLE HIGH SCHOOL
GROUND FLOOR
BULK SAMPLE LOCATION PLAN

NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 1 of 4



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KEY PLAN
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475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607

PROJECT #: 21819

COMMENTS:
WOODSIDE MIDDLE HIGH SCHOOL
FIRST FLOOR
BULK SAMPLE LOCATION PLAN

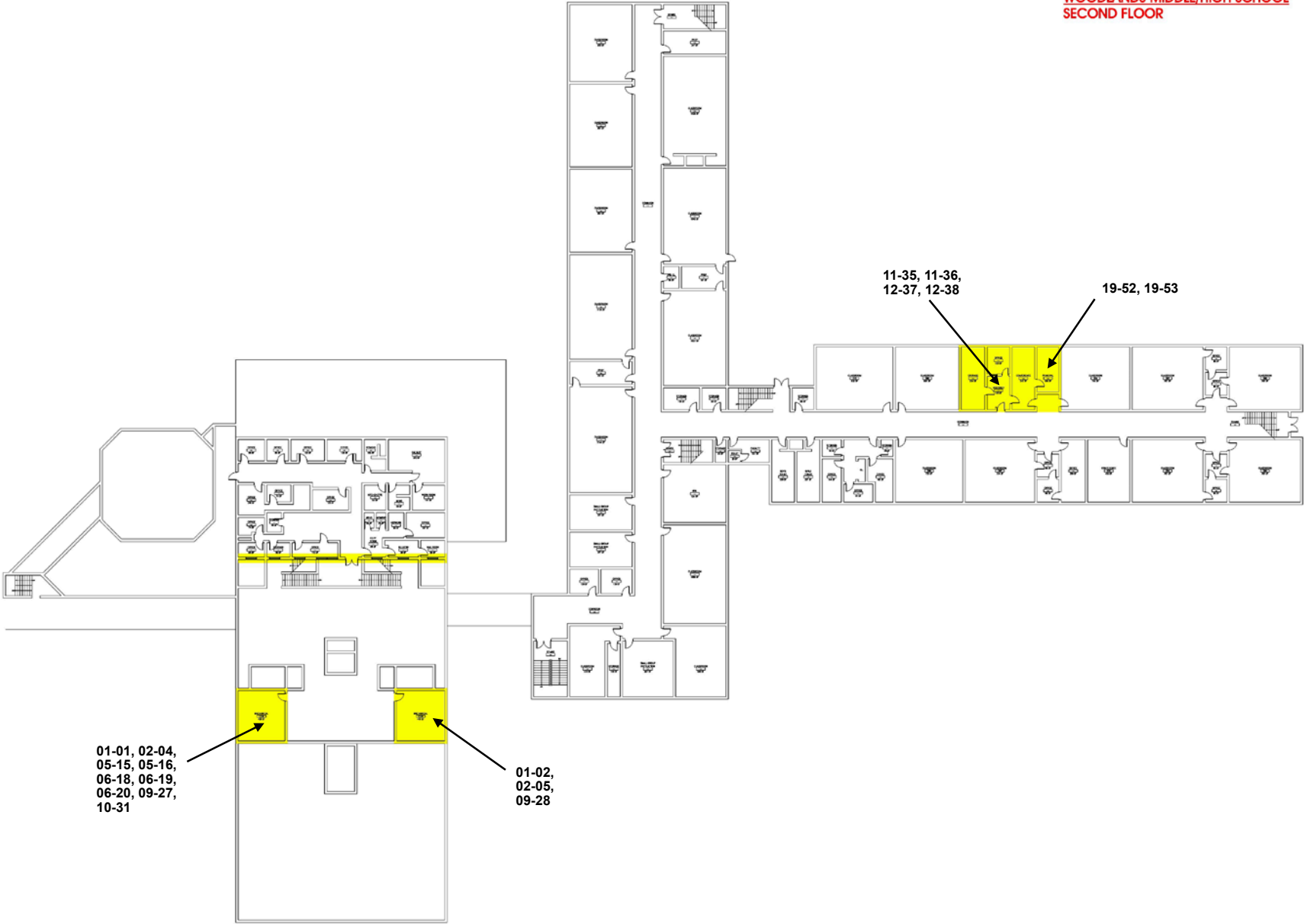
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Date: 03/08/2022

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DRAWING 2 of 4

WOODLANDS MIDDLE/HIGH SCHOOL
SECOND FLOOR



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KEY PLAN
NO SCALE

PROJECT

DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS

CLIENT

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475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607

PROJECT #: 21819

COMMENTS:
WOODSIDE MIDDLE HIGH SCHOOL
SECOND FLOOR
BULK SAMPLE LOCATION PLAN

NOT TO SCALE

Date: 03/08/2022
By: Drew Cheskin

DRAWING 3 of 4

**WOODLANDS MIDDLE/HIGH SCHOOL
THIRD FLOOR**



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KEY PLAN
NO SCALE

PROJECT

DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS

CLIENT

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475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607

PROJECT #: 21819

COMMENTS:
WOODSIDE MIDDLE HIGH SCHOOL
THIRD FLOOR
BULK SAMPLE LOCATION PLAN

NOT TO SCALE

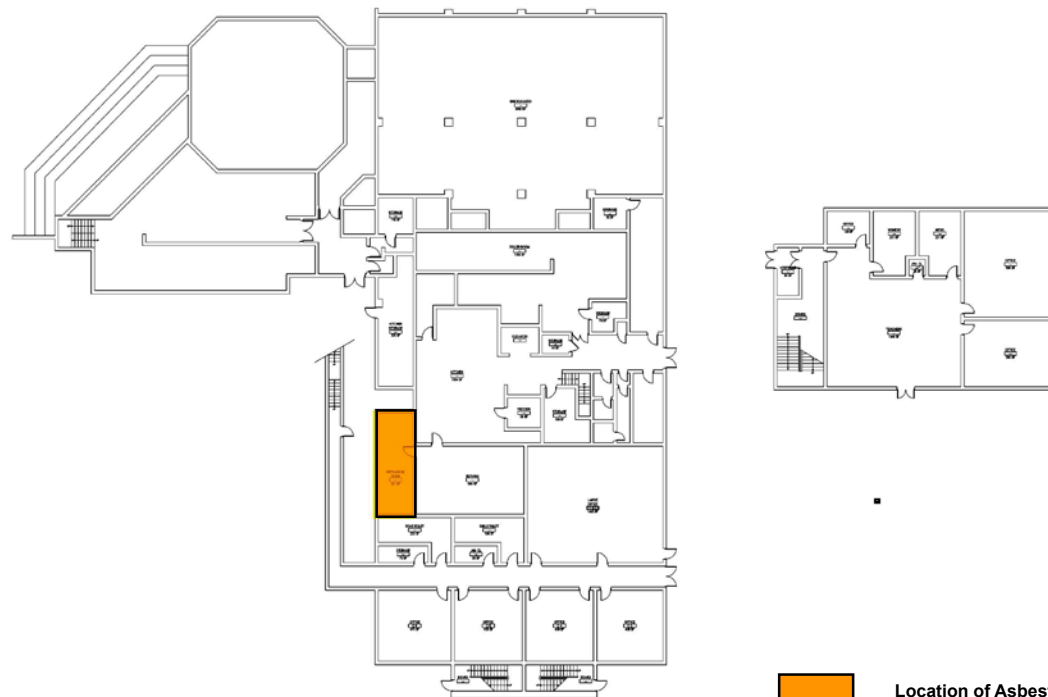
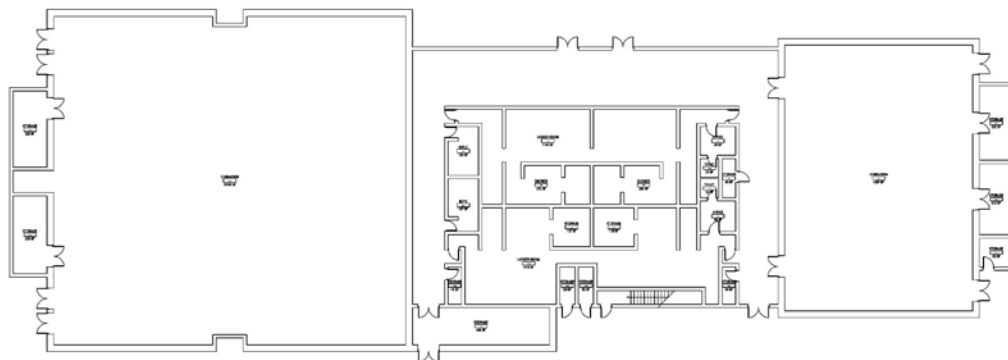
Date: 03/08/2022

By: Drew Cheskin

DRAWING 4 of 4

Appendix C
Asbestos Containing Materials Location Drawings

**WOODLANDS MIDDLE/HIGH SCHOOL
GROUND FLOOR**



Location of Asbestos Containing Elbows to Fiberglass Pipe Insulation



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KEY PLAN
NO SCALE

PROJECT

**DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS**

CLIENT

**GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607**

PROJECT #: 21819

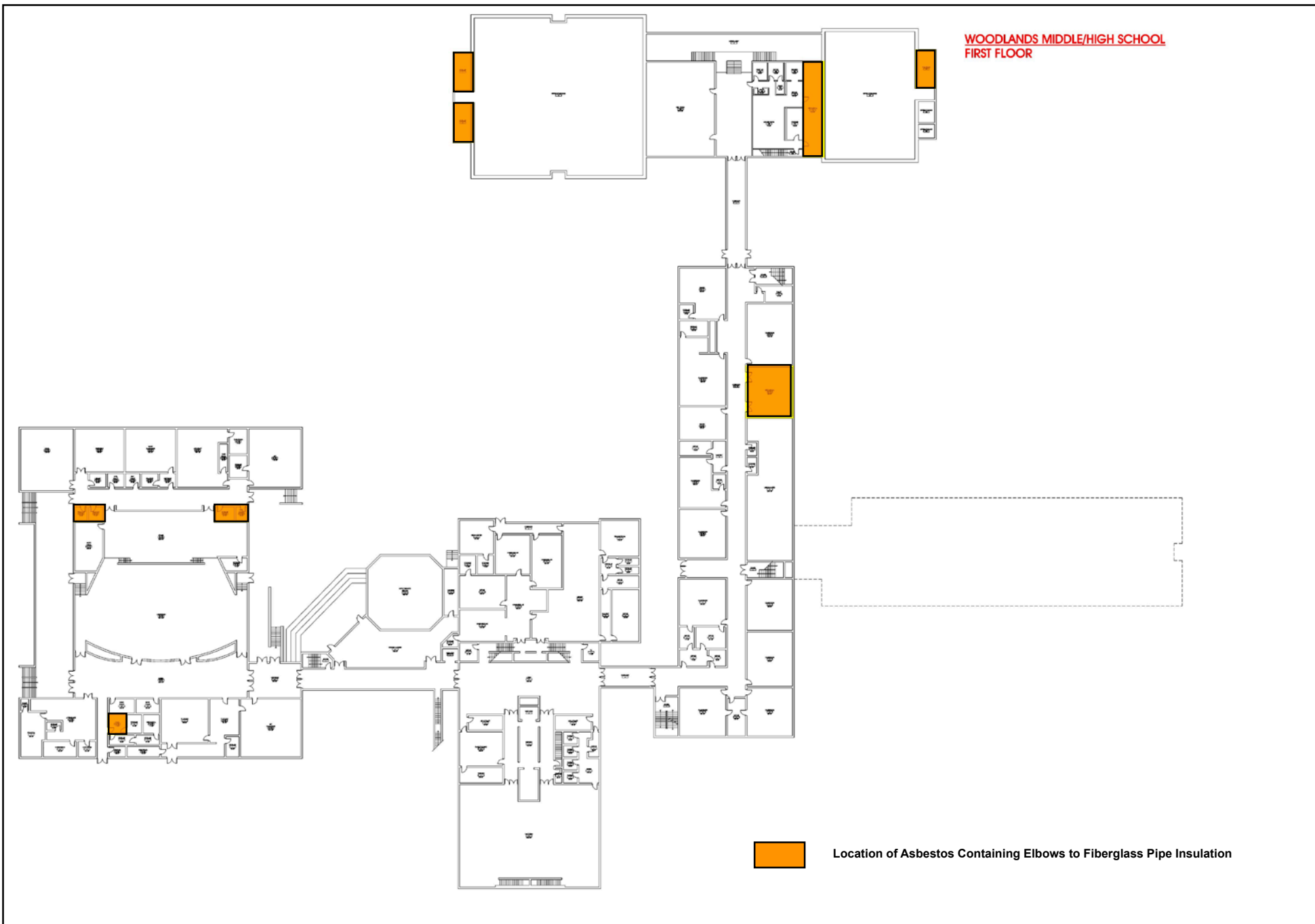
COMMENTS:
WOODSIDE MIDDLE HIGH SCHOOL GROUND
FLOOR
ASBESTOS CONTAINING MATERIALS
LOCATION PLAN


NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 1 of 4




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		<p>CLIENT</p> <p>GREENBURGH CENTRAL SCHOOL DISTRICT 475 WEST HARTSDALE AVENUE HARTSDALE, NY 10607</p>		

WOODLANDS MIDDLE/HIGH SCHOOL
SECOND FLOOR



- Location of Asbestos Containing Elbows to Fiberglass Pipe Insulation & Asbestos Containing Duct Insulation
- Location of Asbestos Containing Elbows to Fiberglass Pipe Insulation

 <div>ENVIROSCIENCE CONSULTANTS, INC 2150 SMITHTOWN AVENUE RONKONKOMA, NY 11779 (631) 580-3191 FAX 580-3195 www.envirohealth.org</div>	KEY PLAN NO SCALE	PROJECT DISTRICT WIDE ASBESTOS & LEAD INSPECTIONS	PROJECT #: 21819 COMMENTS: WOODSIDE MIDDLE HIGH SCHOOL SECOND FLOOR ASBESTOS CONTAINING MATERIALS LOCATION PLAN	NOT TO SCALE Date: 03/08/2022 By: Drew Cheskin
		CLIENT GREENBURGH CENTRAL SCHOOL DISTRICT 475 WEST HARTSDALE AVENUE HARTSDALE, NY 10607		

**WOODLANDS MIDDLE/HIGH SCHOOL
THIRD FLOOR**



Location of Asbestos Containing Elbows to Fiberglass Pipe Insulation



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KEY PLAN
NO SCALE

PROJECT

DISTRICT WIDE ASBESTOS
& LEAD INSPECTIONS

CLIENT

GREENBURGH CENTRAL SCHOOL DISTRICT
475 WEST HARTSDALE AVENUE
HARTSDALE, NY 10607

PROJECT #: 21819

COMMENTS:
WOODSIDE MIDDLE HIGH SCHOOL THIRD
FLOOR
ASBESTOS CONTAINING MATERIALS
LOCATION PLAN

NOT TO SCALE

Date: 03/08/2022

By: Drew Cheskin

DRAWING 4 of 4

Appendix D
Lead XRF Results

Client: Greenburgh Central School District	Date: January 27, 2022
Project: Woodside Middle High School	Job #: 21819
Inspector Name: Drew Cheskin	Signature: <i>Drew Cheskin</i>
	XRF Serial Number: 26952

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
254	-	-	-	Calibration Check	0.90	-
255	-	-	-	Calibration Check	1.00	-
256	-	-	-	Calibration Check	1.10	-
257	Metal	Air Handler	Gray	Kitchen Mechanical Room	0.00	Negative
258	Metal	Transformer	Gray	Kitchen Mechanical Room	0.00	Negative
259	Metal	Pipes	Blue	Kitchen Mechanical Room	0.00	Negative
260	Metal	Breaker Box	Gray	Kitchen Mechanical Room	0.00	Negative
261	Metal	Roof Ladder	Black	Cafeteria Mechanical Room I	0.06	Negative
262	Metal	Air Handler	Gray	Cafeteria Mechanical Room I	0.02	Negative
263	Metal	Ceiling Joist	Bl	Cafeteria Mechanical Room I	0.00	Negative
264	Metal	Hatch to Room	Gray	Cafeteria Mechanical Room I	0.00	Negative
265	Metal	Hatch Frame	Red	Cafeteria Mechanical Room I	0.01	Negative
266	-	-	-	Calibration Check	0.90	-
267	-	-	-	Calibration Check	0.80	-
268	-	-	-	Calibration Check	0.60	-

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
269	-	-	-	Calibration Check	0.80	-
270	-	-	-	Calibration Check	0.90	-
271	VOID	VOID	VOID	VOID	VOID	VOID
272	-	-	-	Calibration Check	1.00	-
273	-	-	-	Calibration Check	1.00	-
274	-	-	-	Calibration Check	1.00	-
275	CMU	Wall (A)	Gray	Room 306A	0.13	Negative
276	Gypsum	Wall (A)	Gray	Room 306A	0.00	Negative
277	Metal	Door Frame	Light Blue	Room 306A	0.03	Negative
278	Wood	Door Frame	Light Blue	Room 306A (to 306B)	0.00	Negative
279	Gypsum	Wall (C)	Gray	Room 306A	0.00	Negative
280	Wood	Chase	Gray	Room 306A (on wall D)	0.00	Negative
281	Gypsum	Wall (A)	Gray	Room 306B	0.00	Negative
282	Gypsum	Wall (B)	Gray	Room 306B	0.00	Negative
283	Metal	Chase	Gray	Room 306B (@ window)	0.00	Negative
284	Gypsum	Wall (D)	Gray	Room 306B	0.00	Negative
285	Wood	Chase	Gray	Room 306B (on wall D)	0.00	Negative
286	Gypsum	Wall (A)	Gray	Room 306C	0.00	Negative
287	CMU	Wall (B)	Gray	Room 306C	0.11	Negative
288	CMU	Wall (C)	Gray	Room 306C	0.10	Negative
289	Wood	Trim	Gray	Room 306C (on wall D)	0.00	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
290	Wood	Door Frame	Light Blue	Room 306C (to 306D)	0.00	Negative
291	Gypsum	Wall (A)	Gray	Room 306D	0.00	Negative
292	CMU	Wall (B)	Gray	Room 306D	0.30	Negative
293	Metal	Partition	Gray	Room 310 - Secretary (on wall A)	0.02	Negative
294	Gypsum	Wall (B)	Gray	Room 310 - Secretary	0.00	Negative
295	Concrete	Column	Gray	Room 310 - Secretary (@ window)	0.00	Negative
296	Wood	Wall (D)	Gray	Room 310 - Secretary	0.00	Negative
297	CMU	Wall (D)	Gray	Room 310 - Secretary	0.00	Negative
298	Metal	Ceiling Tile	Gray	Room 310 - Secretary	0.00	Negative
299	Metal	Partition	Gray	Room 310 - Conference (to storage)	0.10	Negative
300	Gypsum	Wall (D)	Gray	Room 310 - Conference	0.00	Negative
301	CMU	Wall (C)	Gray	Room 310 - Conference	0.00	Negative
302	CMU	Wall (C)	Gray	Room 310 - Storage	0.00	Negative
303	Gypsum	Wall (A)	Gray	Room 310 - Office	0.00	Negative
304	CMU	Wall (C)	Gray	Room 310 - Office	0.00	Negative
305	CMU	Wall (B)	Aqua	3rd Floor HVAC	0.00	Negative
306	Metal	Air Handler	White	3rd Floor HVAC	0.06	Negative
307	Metal	Window Panel	Aqua	3rd Floor HVAC	0.29	Negative
308	Wood	Chase	Aqua	3rd Floor HVAC (@ window)	0.60	Negative
309	Metal	Ceiling Joist	Beige	3rd Floor HVAC	0.40	Negative
310	Gypsum	Wall (A)	Salmon	Room 206A - Storage	0.00	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
311	Metal	Door Frame	Salmon	Room 206A - Storage	0.00	Negative
312	Wood	Panel	Salmon	Room 206A - Storage (@ window)	0.01	Negative
313	Metal	Chase	Salmon	Room 206A - Storage (@ window)	0.00	Negative
314	Gypsum	Wall (C)	Salmon	Room 206A - Storage	0.01	Negative
315	Wood	Chase	Salmon	Room 206A - Storage (@ ceiling/wall C)	0.01	Negative
316	Gypsum	Wall (C)	Pink	Room 206A - Vestibule	0.00	Negative
317	Metal	Door Frame	Black	Room 206A - Vestibule (to office)	0.00	Negative
318	Wood	Door	Black	Room 206A - Vestibule (to office)	0.00	Negative
319	Gypsum	Wall (B)	Pink	Room 206A - Office	0.00	Negative
320	Gypsum	Wall (D)	Pink	Room 206A - Office	0.03	Negative
321	Gypsum	Wall (A)	Gray	Room 206A - Conference Room	0.00	Negative
322	Gypsum	Wall (C)	Gray	Room 206A - Conference Room	0.00	Negative
323	Gypsum	Wall (D)	Gray	Room 206A - Conference Room	0.00	Negative
324	Metal	Door Frame	Black	Room 206A - Conference Room (to Principal)	0.04	Negative
325	Wood	Door	Black	Room 206A - Conference Room (to Principal)	0.00	Negative
326	Metal	Spline Ceiling	Gray	Room 206A - Conference Room	0.00	Negative
327	Gypsum	Wall (A)	Cream	Room 206A - Principal	0.00	Negative
328	Gypsum	Wall (C)	Cream	Room 206A - Principal	0.00	Negative
329	CMU	Wall (D)	Cream	Room 206A - Principal	0.00	Negative
330	Metal	Hangers	Black	Room 206A - Principal (above 2"x4" CT)	0.00	Negative
331	Metal	Door Frame	Yellow	1st Floor - HVAC 117A	0.22	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
332	CMU	Wall (A)	Light Blue	1st Floor - HVAC 117A	0.00	Negative
333	CMU	Wall (B)	Light Blue	1st Floor - HVAC 117A	0.00	Negative
334	Cement	Wall (C)	Light Blue	1st Floor - HVAC 117A	0.00	Negative
335	CMU	Wall (D)	Light Blue	1st Floor - HVAC 117A	0.00	Negative
336	Metal	Pipes	Light Blue	1st Floor - HVAC 117A	0.03	Negative
337	Metal	Conduit	Light Blue	1st Floor - HVAC 117A	0.00	Negative
338	Metal	Air Handler	White	1st Floor - HVAC 117A	0.02	Negative
339	Metal	Air Handler	Gray	1st Floor - HVAC 117A	0.04	Negative
340	Metal	Duct Work	White	1st Floor - HVAC 117A	0.01	Negative
341	Metal	Breaker Box	Gray	1st Floor - HVAC 117A	0.00	Negative
342	Plaster	Ceiling	White	1st Floor - HVAC 117A	0.02	Negative
343	Metal	Conduit	White	1st Floor - HVAC 117A	0.00	Negative
344	Metal	Window Frame	Gray	Guidance - Mail Room	0.14	Negative
345	Wood	Window Stool	Gray	Guidance - Mail Room	0.10	Negative
346	Particle Board	Wall (D)	Gray	Guidance - Mail Room	0.18	Negative
347	Metal	Window Frame	Gray	Guidance - News & Postings Room	0.11	Negative
348	Wood	Window Stool	Gray	Guidance - News & Postings Room	0.00	Negative
349	Particle Board	Wall (D)	Gray	Guidance - News & Postings Room	0.13	Negative
350	Metal	Window Frame	Gray	Guidance - Copy Room	0.03	Negative
351	Wood	Window Stool	Gray	Guidance - Copy Room	0.00	Negative
352	Particle Board	Wall (D)	Gray	Guidance - Copy Room	0.08	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
353	Metal	Door Partition	Green	Guidance - Main Entry	0.07	Negative
354	Particle Board	Wall (A)	White	Guidance - Main Entry	0.17	Negative
355	Metal	Chase	White	Guidance - Main Entry	0.00	Negative
356	Metal	Window Frame	Yellow	Guidance - First Office	0.03	Negative
357	Wood	Window Stool	Yellow	Guidance - First Office	0.01	Negative
358	Particle Board	Wall (C)	Cream	Guidance - First Office	0.11	Negative
359	Metal	Window Frame	Cream	Guidance - Storage	0.04	Negative
360	Wood	Window Stool	Cream	Guidance - Storage	0.00	Negative
361	Particle Board	Wall (C)	Cream	Guidance - Storage	0.07	Negative
362	Metal	Window Frame	Aqua	Guidance - Second Office	0.05	Negative
363	Wood	Window Stool	Aqua	Guidance - Second Office	0.00	Negative
364	Particle Board	Wall (C)	Aqua	Guidance - Second Office	0.04	Negative
365	-	-	-	Calibration Check	1.10	-
366	-	-	-	Calibration Check	0.90	-
367	-	-	-	Calibration Check	1.00	-
368	VOID	VOID	VOID	VOID	VOID	VOID
369	-	-	-	Calibration Check	0.80	-
370	-	-	-	Calibration Check	1.00	-
371	-	-	-	Calibration Check	0.90	-
372	Wood	Door	White	Art Wing - Office A	0.00	Negative
373	Metal	Door Frame	White	Art Wing - Office A	0.01	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
374	CMU	Wall (B)	White	Art Wing - Office A	0.00	Negative
375	Gypsum	Wall (C)	White	Art Wing - Office A	0.00	Negative
376	Wood	Door	Green	Art Wing - Office A	0.08	Negative
377	Metal	Door Frame	Green	Art Wing - Office A	0.00	Negative
378	Wood	Door	White	Art Wing - Office B	0.00	Negative
379	Metal	Door Frame	White	Art Wing - Office B	0.00	Negative
380	CMU	Wall (B)	White	Art Wing - Office B	0.00	Negative
381	Gypsum	Wall (C)	Gray	Art Wing - Office B	0.00	Negative
382	CMU	Wall (D)	Gray	Art Wing - Office B	0.00	Negative
383	Metal	Ceiling Hatch	Gray	Art Wing - Office B	0.01	Negative
384	Wood	Door	Green	Art Wing - Office B	0.00	Negative
385	Metal	Door Frame	Green	Art Wing - Office B	0.01	Negative
386	Metal	Door Frame	White	Art Wing - Kiln Room	0.06	Negative
387	CMU	Wall (B)	White	Art Wing - Kiln Room	0.00	Negative
388	Metal	Ladder	Yellow	Art Wing - Kiln Room	0.16	Negative
389	Wood	Door	Green	Art Wing - Kiln Room	0.00	Negative
390	Metal	Door Frame	Green	Art Wing - Kiln Room	0.06	Negative
391	Metal	Door Frame	Yellow	Art Wing - Slop Sink Closet	0.01	Negative
392	CMU	Wall (B)	Gray	Art Wing - Slop Sink Closet	0.01	Negative
393	Metal	Hatch	Gray	Art Wing - Slop Sink Closet	0.11	Negative
394	CMU	Wall (C)	Cream	Art Wing - Slop Sink Closet	0.00	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
395	Metal	Breaker Box	Gray	Art Wing - Slop Sink Closet	0.03	Negative
396	Metal	Transformer	Gray	Art Wing - Slop Sink Closet	0.00	Negative
397	Concrete	Floor	Red	Art Wing - Slop Sink Closet	0.11	Negative
398	Metal	Electrical Box	Green	Art Wing - Slop Sink Closet	0.02	Negative
399	Metal	Door Frame	Green	Package/File Room	0.07	Negative
400	CMU	Wall (A)	Cream	Package/File Room	0.00	Negative
401	CMU	Wall (C)	Cream	Package/File Room	0.00	Negative
402	Metal	Conduit	Cream	Package/File Room	0.00	Negative
403	Metal	Hatch to Room	Gray	Cafeteria Mechanical Room II	0.00	Negative
404	Metal	Hatch Frame	Red	Cafeteria Mechanical Room II	0.02	Negative
405	Metal	Ceiling Joist	Beige	Gym Wing - Boy's Locker Storage	0.00	Negative
406	Metal	Roof Hatch Frame	Beige	Gym Wing - Boy's Locker Storage	0.04	Negative
407	Metal	Ladder	Brown	Gym Wing - Boy's Locker Storage	0.09	Negative
408	CMU	Wall (A)	White	Gym Wing - Boy's Locker Storage	0.00	Negative
409	CMU	Wall (A)	Green	Gym Wing - Boy's Locker Storage	0.00	Negative
410	Metal	Duct Work	Beige	Gym Wing - Boy's Locker Mechanical Room	0.02	Negative
411	Metal	Ceiling Joist	Beige	Gym Wing - Boy's Locker Mechanical Room	0.00	Negative
412	Metal	Door Frame	Tan	Gym Wing - Boy's Locker Mechanical Room	0.00	Negative
413	Metal	Breaker Box	Gray	Gym Wing - Boy's Locker Mechanical Room	0.06	Negative
414	Metal	Door Lintel	Beige	Small Gym - Right HVAC Room	0.30	Negative
415	Metal	Door Frame	Beige	Small Gym - Right HVAC Room	0.01	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm2	Classification
416	Metal	Door Lintel	Beige	Small Gym - Left HVAC Room	0.19	Negative
417	Metal	Door Frame	Beige	Small Gym - Left HVAC Room	0.04	Negative
418	Metal	Door Lintel	Beige	Large Gym - Right HVAC Room	0.06	Negative
419	Metal	Door Frame	Beige	Large Gym - Right HVAC Room	0.02	Negative
420	Metal	Door	Gray	Large Gym - Right HVAC Room	0.00	Negative
421	Metal	Door Lintel	Beige	Large Gym - Left HVAC Room	0.08	Negative
422	Metal	Door Frame	Green	Large Gym - Left HVAC Room	0.01	Negative
423	Metal	Door	Green	Large Gym - Left HVAC Room	0.00	Negative
424	-	-	-	Calibration Check	0.90	-
425	-	-	-	Calibration Check	1.00	-
426	-	-	-	Calibration Check	0.90	-

Appendix E

Photo Log



Asbestos containing Elbows to Fiberglass Pipe Insulation with Canvas Wrap, Gray



Non-asbestos containing Duct Vibration Dampener, Green



Asbestos containing Duct Insulation, Gray



Asbestos containing Elbows to Fiberglass Pipe Insulation with Tar Containing Wrap, Gray

Appendix F

Certifications

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Enviroscience Consultants, LLC

2150 Smithtown Avenue

Ronkonkoma, NY 11779

FILE NUMBER: 99-0882

LICENSE NUMBER: 28733

LICENSE CLASS: RESTRICTED

DATE OF ISSUE: 11/15/2021


EXPIRATION DATE: 11/30/2022

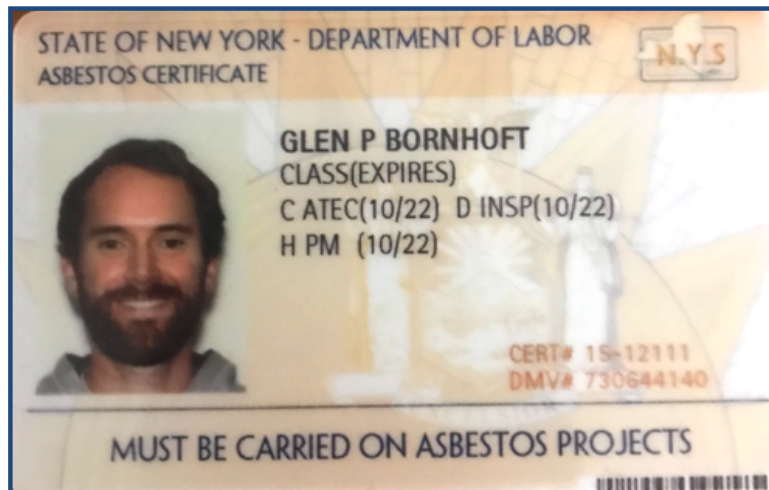
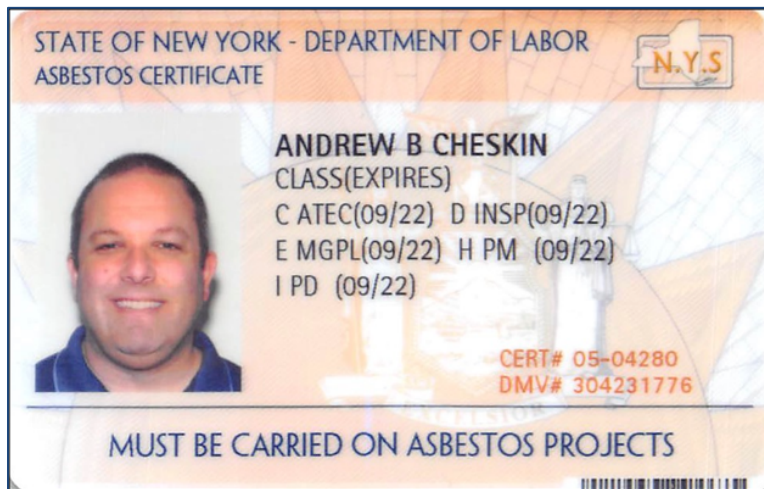
Duly Authorized Representative – Glenn Neuschwender:

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

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

SH 432 (8/12)


Amy Phillips, Director
For the Commissioner of Labor



United States Environmental Protection Agency

This is to certify that

Enviroscience Consultants, Inc.

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

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires May 28, 2022

LBP-1327-1

Certification #

January 29, 2019

Issued On



Michelle Price

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that

Andrew B Cheskin

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

Risk Assessor

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires August 06, 2024

LBP-R-11931-2

Certification #

August 02, 2021

Issued On



Ben Conetta

Ben Conetta, Chief

Chemicals and Multimedia Programs Branch

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2022
Issued April 01, 2021
Revised October 19, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. GLENN L. NEUSCHWENDER
ENVIROSCIENCE CONSULTANTS, LLC
2150 SMITHTOWN AVENUE SUITE 3
RONKONKOMA, NY 11779

NY Lab Id No: 11681

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

Miscellaneous

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

Serial No.: 63960

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

Page 1 of 1

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Enviroscience Consultants, LLC

2150 Smithtown Ave.
Suite 3
Ronkonkoma, NY 11779
Mr. Edward Detweiler
Phone: 631-580-3191 Fax: 631-580-3195
Email: edetweiler@envirohealth.org
<http://www.envirohealth.org>

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 200531-0

Bulk Asbestos Analysis

Code

Description

18/A01

EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

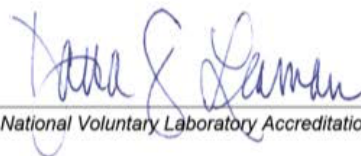
Airborne Asbestos Analysis

Code

Description

18/A02

U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



For the National Voluntary Laboratory Accreditation Program

Effective 2021-10-01 through 2022-09-30

Page 1 of 1

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200531-0

Enviroscience Consultants, LLC
Ronkonkoma, NY

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2021-10-18 through 2022-09-30
Effective Dates



[Signature]
For the National Voluntary Laboratory Accreditation Program

Limited Environmental Survey

**Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530**

**Early Childhood Program
475 West Hartsdale Avenue
Hartsdale, NY 10530**

March 2022



2150 Smithtown Ave., Suite 3, Ronkonkoma, NY 11779

T: 631.580.3191 • **F:** 631.580.3195 • **W:** envirohealth.org

ASBESTOS & LEAD SURVEY REPORT

Early Childhood Program

475 West Hartsdale Avenue

Hartsdale, NY 10530

March 2022

Enviroscience Project No. 21819

Prepared for: Greenburgh Central School District
475 West Hartsdale Avenue
Hartsdale, NY 10530

Prepared by: ENVIROSCIENCE CONSULTANTS, LLC.
2150 Smithtown Avenue
Ronkonkoma, NY 11779
(631) 580-3191

37 Moore Avenue
Mount Kisco, NY 10549
(914) 864-1699

Asbestos / Lead Inspector: Drew Cheskin
Drew Cheskin
NYS Asbestos Certificate: 05-04280
NYS/EPA Lead Risk Assessor: LBP-R-11931-1

Asbestos / Lead Inspector: Glen Bornhoft
Glen Bornhoft
NYS Asbestos Certificate: 15-12111

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3.2	Lead Sampling Results

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Appendix C	Asbestos Containing Materials Location Drawings
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Appendix E	Photo Log
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1.0 EXECUTIVE SUMMARY

Greenburgh Central School District retained Enviroscience Consultants, LLC. to conduct a limited asbestos & lead survey at the Early Childhood Program building, 475 West Hartsdale Avenue, Hartsdale, New York. The purpose of this survey was to identify and quantify asbestos containing materials (ACM) & Lead-based paint (LBP) that may be affected by proposed renovations within the building.

The survey was performed on January 11th & 12th, 2022, and based upon written and verbal communications with Jim Weydig of BBS Architects (BBS). Floor plans with highlighted areas were provided, but no architectural, renovation, demolition or proposed construction plans were provided, and no comprehensive written scope of work was available at the time of the survey. As a result, the survey consisted of inspecting the highlighted areas of the provided floor plans, and with the guidance from BBS, sampling or testing accessible materials for asbestos or lead content. No destructive or invasive measures were used to identify or sample materials, and live electrical and operating mechanical systems were not accessed for inspection. Upon receipt of finalized architectural drawings, additional sampling may be required.

Asbestos

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials **contain asbestos** (greater than 1-percent);

- **9"x9" Floor Tile, Red (Classroom 002B)**
- **Mastic to 9"x9" Red Floor Tile, Black (Classroom 002B)**

The following materials were not sampled, but are **presumed to contain asbestos** (greater than 1-percent) based on historical testing of similar materials;

- **9"x9" Floor Tile, Blue (Classrooms 002 & 002A)**
- **9"x9" Floor Tile, White (Classrooms 002 & 002A)**
- **Mastic to 9"x9" Blue & White Floor Tiles (Classrooms 002 & 002A)**

For each survey conducted, the inspector classifies ACM or Assumed ACM materials by friability and condition. This helps to determine the extent of damage in certain areas as well as the potential for further damage and Asbestos release due to disturbance of the material.

Material Location	Material	Quantity*	Friability	Condition
Classroom 002	9"x9" Blue & White Floor Tiles	800 SF	No	Good
	Mastic to 9"x9" Blue & White Floor Tiles		No	Good
Classroom 002A	9"x9" Blue & White Floor Tiles	155 SF	No	Good
	Mastic to 9"x9" Blue & White Floor Tiles		No	Good
Classroom 002B	9"x9" Floor Tile, Red	155 SF	No	Good
	Mastic to 9"x9" Red Floor Tile, Black		No	Good

*** All quantities in this assessment are estimations. An abatement contractor should perform a site walk through and calculate quantities prior to submitting a proposal.**

Condition Definitions:

Good: None/Minimal apparent damage to ACM

Fair: Up to 10% localized damage or up to 25% of the entire ACM is damaged

Poor: Over 10% localized damage or over 25% of the entire ACM is damaged

Asbestos-containing materials (ACM) may only be removed or disturbed by a certified and licensed asbestos abatement contractor. Project monitoring for asbestos abatement projects by an independent air-monitoring firm under contract of the Owner is required, with air sampling being required for most projects. All other materials tested negative for asbestos.

Lead

An EPA certified lead risk assessor used an X-ray Fluorescence (XRF) analyzer to inspect the building in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision. OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount.

The following surfaces were identified with lead levels above the HUD Guideline definition of greater than 1.0 milligram per square centimeter (mg/cm²):

- **Wood, Window Frame (Inner), White, Toilet B**
- **Plaster, Wall (B), Light Blue, Classroom 001**

- Plaster, Wall (B), Light Blue, Classroom 001
- Wood, Window Frame, White, Classroom 001
- Wood, Window Stool, White, Classroom 001
- Wood, Window Frame, White, Classroom 001
- Wood, Window Stool, White, Classroom 001
- Plaster, Wall (D), Yellow, Classroom 002
- Wood, Panel to Fire Alarm, Yellow, Classroom 002
- Wood, Window Frame, White, Classroom 002
- Wood, Wall (D), Yellow, Classroom 002A
- Wood, Window Frame (Inner), White, Classroom 002A
- Wood, Window Frame (Old), Brown, Classroom 002B
- Wood, Window Stool (Old), Light Blue, Classroom 002B
- Wood, Door Frame, Brown, Classroom 002B
- Plaster, Wall (D), Light Blue, Classroom 003
- Plaster, Wall (B), Light Blue, Classroom 003
- Metal, Window Sash, White, Classroom 003
- Metal, Window Frame, White, Classroom 003
- Plaster, Ceiling, White, Classroom 003
- Wood, Window Stool (Old), White, Classroom 003
- Wood, Window Frame (Old), Blue, Toilet D
- Plaster, Wall (B), Yellow, Classroom 004
- Plaster, Wall (D), Yellow, Classroom 004
- Wood, Window Frame (old), White, Classroom 004

A full list of components sampled as part of the Lead-based Paint Survey is included in Section 3.0.

2.0 ASBESTOS SURVEY

2.1 Asbestos Survey Procedures

The asbestos survey was designed to meet all requirements specified in the *NYS Asbestos Code Rule, 12 NYCRR Part 56, Subpart 56-5.1 Asbestos Survey Requirements for Building/Structure Demolition, Renovation, Remodeling and Repair*. The asbestos survey was conducted by New York State certified asbestos inspectors. Sample analysis was performed by Enviroscience Consultants, LLC., a New York State Department of Health Environmental Laboratory Approval Program accredited laboratory.

New York State requires that the asbestos survey information be transmitted by the building owner as follows:

- One copy of the completed asbestos survey shall be sent by the owner or their agent to the local government entity charged with issuing a permit for such demolition, renovation, remodeling or repair work under applicable State or local laws.
- The completed asbestos survey for controlled demolition or pre-demolition asbestos projects shall also be submitted to the appropriate Asbestos Control Bureau district office.
- The completed asbestos survey shall be kept on the construction site with the asbestos notification and variance, if required, throughout the duration of the asbestos project and any associated demolition, renovation, remodeling or repair project.

Enviroscience performed a site investigation of target areas within the building that included a visual inspection of all accessible areas designated for renovation. Material systems were assigned into groups of homogeneous materials. A homogeneous material is defined as a material that is alike in color and texture that was installed at the same time. Samples were then collected from each homogeneous area according to USEPA AHERA requirements. Based upon sample results, each sampled homogeneous area was classified as either asbestos or non-asbestos containing. An asbestos containing material is defined by the USEPA as a material containing greater than one percent asbestos by weight.

New York State certified Asbestos Inspector Drew Cheskin (cert. #05-04280) and New York State certified Asbestos Inspector Glen Bornhoft (cert. #15-12111) conducted the survey on January 11th & 12th, 2022. Certifications are provided in Appendix F. The inspectors entered all accessible areas to identify and sample suspect asbestos containing materials. Please reference Asbestos Bulk Sample Location Drawings in Appendix B. Asbestos-containing materials (ACM) are noted above in the Executive Summary and in this section. Also reference the Asbestos Bulk Sample Results in Appendix A and Asbestos Containing Materials Location Drawings in Appendix C.

Photographs in Appendix E are typical and do not show all of the asbestos materials that they represent.

Any asbestos containing materials that will be disturbed during renovation or demolition must be removed by a New York State certified and licensed asbestos abatement contractor. Air monitoring is required for most asbestos projects.

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. indicate that the following materials are **classified as non-asbestos containing** (less than or equal to 1-percent) and may be removed or disturbed as regular construction materials:

- 12"x12" Floor Tile, Beige (Offices 001, 002, 002A & Hallway)
- Mastix to 12"x12" Beige Floor Tile, Black (Offices 001, 002, 002A & Hallway)
- 12"x12" Floor Tile, Green (Classroom 001)
- Mastix to 12"x12" Green Floor Tile, Brown (Classroom 001)
- 12"x12" Floor Tile, White (Classroom 002B, over 9"x9" Red Floor Tile)
- Mastix to 12"x12" White Floor Tile, Brown (Classroom 002B, over 9"x9" Red Floor Tile)
- 12"x12" Floor Tile, Cream (Toilet A, near offices)
- Mastix to 12"x12" Cream Floor Tile, Brown (Toilet A, near offices)
- Vinyl Cove Base Mastix, Cream (Toilet A, near offices)
- Ceramic Wall Tile Grout (Toilet B, in classroom 001)
- Ceramic Wall Tile Backing (Toilet B, in classroom 001)
- Ceramic Wall Tile Mastix (Toilet C, in classroom 002)
- 1"x1" Ceramic Floor Tile Mortar (Toilet C, in classroom 002 & toilet D, in classroom 003)
- Ceramic Wall Tile Backing (Toilet D, in classroom 003)
- Ceramic Wall Tile Grout (Toilet D, in classroom 003)
- 2"x2" Ceramic Floor Tile Mortar (Toilet D, in classroom 003)

Refer to the Bulk Sample Results #32079 for detailed sample information.

Analytical results of the bulk samples collected by Enviroscience Consultants, LLC. for project #20919 from June, 2021, indicate that the following materials are **classified as non-asbestos containing** (less than or equal to 1-percent) and may be removed or disturbed as regular construction materials:

- 2'x2' Ceiling Tile, Tectum, White (hung) (Security/Office spaces next door)
- Mastix to 1'x1' Fiberglass Ceiling Tile, Brown (top layer) (Office/Hallway wing)
- 2'x4' Ceiling Tile, White (attached to 1'x1' Fiberglass) (Office 001)

- Mastic to 2'x4' Ceiling Tile, Tan (Office 001)
- 2'x4' Ceiling Tile, White (hung, bottom layer) (Office 001 & classroom 001)
- 1'x1' Ceiling Tile, White (patches) (Office hallway)
- Mastic to 1'x1' Patches Ceiling Tile, Tan (Office hallway)
- 2'x4' Ceiling Tile, Off-White (hung) (Classrooms 002 & 002A)
- 2'x4' Ceiling Tile, White (hung) (Kitchen)
- 1'x1' Ceiling Tile, Pinhole, Gray (Classroom 001 & Toilet B)
- Wall Plaster, finish coat, White (Throughout)
- Wall Plaster, scratch coat, Brown (Throughout)
- Skim Coat on Concrete/CMU, White (Classrooms 003 & 004)
- Ceiling Plaster, finish coat, White (Throughout)
- Ceiling Plaster, scratch coat, Brown (Throughout)
- Textured Ceiling Skim Coat, White (Classrooms 003 & 004)
- Gypsum Board, Gray (Throughout)

Refer to the Bulk Sample Results #29888 for detailed sample information.

The following materials are **classified as non-suspect** (not considered suspect asbestos containing materials by EPA or NYS DOL) and may be removed or disturbed as regular construction materials:

- Brick
- CMU
- Concrete
- Fiberglass Pipe Insulation w/Hard Fiberglass Elbows
- Rubber/Vinyl Wire Insulation
- Stone

The following **locations were not inspected** due to inaccessibility, the destructive nature of the testing and inability to repair the building component, live electrical or active mechanical components, or by directive of the client. Should work in these areas reveal previously un-sampled suspect asbestos containing materials, these materials must be **assumed asbestos containing** and all activities in the area(s) must stop immediately until proper sample collection and laboratory analysis has been performed:

- No exterior materials were sampled

- No penetrations into exterior walls were made
- Wooden floors in classrooms 003 & 004 were not penetrated

2.2 Asbestos Sampling Procedures

Samples of suspect asbestos materials were collected in accordance with United States Environmental Protection Agency guidelines as outlined below. These sampling procedures were implemented in an effort to minimize the release of asbestos fibers during sampling and to provide control of samples through analysis and reporting.

- Samples were collected in unoccupied areas.
- Surfaces of the material to be sampled were wetted with water mist prior to collection.
- Samples were collected with a cork borer, knife, or other approved sampling tool.
- Sampling tools were decontaminated between each sample.
- Individual sealable containers were used to contain each of the collected samples.
- Samples were double-bagged for transportation to the laboratory.
- Sample containers were labeled with a date and unique sample ID number using a permanent marker.

At the completion of sampling activities, bulk samples were relinquished to the laboratory for analysis. Enviroscience Consultants, LLC. is a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program accredited environmental testing laboratory (ELAP #11681). The laboratory is also accredited by the National Voluntary Laboratory Accreditation Program, (NVLAP Lab Code 200531-0).

All asbestos bulk samples were analyzed by Polarized Light Microscopy (PLM). Samples of cellulose ceiling tiles, and non-friable organically bound (NOB) materials such as floor tiles and roofing material, that were found to contain less than 1% asbestos by PLM were then analyzed using Transmission Electron Microscopy (TEM). According to the Department of Health, NOB materials may first be analyzed by PLM. If asbestos is not found using PLM, the sample must be analyzed with the higher-powered transmission electron microscope.

3.0 LEAD-BASED PAINT INSPECTION

3.1 Lead Inspection Procedures

Enviroscience Consultants, LLC. conducted a limited Lead-based Paint Inspection throughout select interior locations of the Early Childhood Program building. The purpose of the limited Lead-based Paint Inspection was to identify surfaces and building components which may be coated with lead-based paint. An EPA certified lead inspector/risk assessor used an X-ray Fluorescence (XRF) analyzer to test building components in accordance with the New York State Education Department requirements and the US Housing and Urban Development Agency Guidelines for the Evaluation and Control of Lead-based Paint in Housing, Chapter 7, Lead-based Paint Inspection, 1997 Revision.

3.2 Lead Sampling Results

Tested components and surfaces include:

- Wood, Window Frame, White, Office 001
- Wood, Window Stool, White, Office 001
- Wood, Window Frame, White, Office 001
- Wood, Window Stool, White, Office 001
- Wood, Ext. Window Frame, Brown, Office 001
- Wood, Ext. Window Sill, Brown, Office 001
- Stucco, Ext. Window Sill, Beige, Office 001
- Wood, Window Frame, White, Office 002
- Wood, Window Stool, White, Office 002
- Wood, Wall Panel (D), Light Blue, Office 002
- Wood, Window Frame, White, Nurse's Office
- Wood, Window Stool, White, Nurse's Office
- Wood, Wall Panel (C), Light Blue, Nurse's Office
- Wood, Ext. Window Frame, Brown, Nurse's Office
- Wood, Ext. Window Sill, Brown, Nurse's Office
- Stucco, Ext. Window Sill, Beige, Nurse's Office
- Wood, Wall Panel (D), Light Blue, Nurse's Office
- Wood, Wall Panel (A), White, Toilet A
- Wood, Wall Panel (B), White, Toilet A
- Wood, Wall Panel (C), White, Toilet A
- Wood, Wall Panel (D), White, Toilet A
- Wood, Door, White, Toilet A
- Wood, Door Frame, White, Toilet A
- Wood, Window Frame, White, Toilet A
- Metal, Radiator Cover, White, Toilet A

- Ceramic, Sink, White, Toilet A
- Ceramic, Toilet, White, Toilet A
- Gypsum, Ceiling, White, Toilet A
- Gypsum, Wall Panel (A), Yellow, Toilet B
- Gypsum, Wall Panel (B), Yellow, Toilet B
- Gypsum, Wall Panel (C), Yellow, Toilet B
- Gypsum, Wall Panel (D), Yellow, Toilet B
- Wood, Door, White, Toilet B
- Wood, Door Frame, White, Toilet B
- Gypsum, Wall, Light Blue, Toilet B
- Wood, Window Frame (Inner), White, Toilet B
- Wood, Window Frame (Outer), White, Toilet B
- Wood, Window Stool, White, Toilet B
- Wood, Radiator Cover, White, Toilet B
- Ceramic, Toilet, White, Toilet B
- Plaster, Wall (B), Light Blue, Classroom 001
- Plaster, Wall (B), Light Blue, Classroom 001
- Brick, Wall (B), Light Blue, Classroom 001
- Wood, Window Frame, White, Classroom 001
- Wood, Window Stool, White, Classroom 001
- Wood, Window Frame, White, Classroom 001
- Wood, Window Stool, White, Classroom 001
- Wood, Window Frame, White, Classroom 001
- Wood, Window Stool, White, Classroom 001
- Wood, Window Frame, White, Classroom 001
- Wood, Window Stool, White, Classroom 001
- Wood, Radiator Cover, White, Classroom 001
- Wood, Radiator Cover, White, Classroom 001
- Wood, Radiator Cover, White, Classroom 001
- Wood, Pipe Chase, Light Blue, Classroom 001
- Wood, Baseboard, White, Classroom 001
- Plaster, Wall (D), Yellow, Classroom 002
- Wood, Panel to Fire Alarm, Yellow, Classroom 002
- Metal, Conduit, Yellow, Classroom 002
- Gypsum, Door Framing, Yellow, Classroom 002
- Wood, Door, White, Classroom 002
- Wood, Door Frame, White, Classroom 002
- Concrete, Steps, Yellow, Classroom 002
- Metal, Railing, Black, Classroom 002
- Wood, Wall Panel, Yellow, Classroom 002
- Plaster, Wall (C), Yellow, Classroom 002
- Wood, Window Frame, White, Classroom 002
- Gypsum, Wall (A), Blue, Toilet C

- Gypsum, Wall (B), Blue, Toilet C
- Gypsum, Wall (C), Blue, Toilet C
- Gypsum, Wall (D), Blue, Toilet C
- Wood, Door, White, Toilet C
- Wood, Door Frame, White, Toilet C
- Ceramic, Sink, White, Toilet C
- Ceramic, Toilet, White, Toilet C
- Gypsum, Ceiling, Blue, Toilet C
- Wood, Steps, Yellow, To Toilet C
- Wood, Steps, Brown, To Toilet C
- Wood, Wall (D), Yellow, Classroom 002A
- Wood, Window Frame (Inner), White, Classroom 002A
- Wood, Window Frame (Outer), White, Classroom 002A
- Wood, Window Stool, White, Classroom 002A
- Wood, Window Frame (Old), Brown, Classroom 002B
- Wood, Window Stool, Light Blue, Classroom 002B
- Wood, Wall Panel (C), Light Blue, Classroom 002B
- Wood, Window Stool (Old), Light Blue, Classroom 002B
- Wood, Door, Brown, Classroom 002B
- Wood, Door Frame, Brown, Classroom 002B
- Wood, Wall Panel (B), Light Blue, Classroom 002B
- Metal, Radiator Cover, Light Blue, Classroom 002B
- Plaster, Wall (D), Light Blue, Classroom 003
- Plaster, Wall (B), Light Blue, Classroom 003
- Wood, Window Frame, White, Classroom 003
- Wood, Window Stool, White, Classroom 003
- Metal, Window Sash, White, Classroom 003
- Metal, Window Frame, White, Classroom 003
- Plaster, Ceiling, White, Classroom 003
- Gypsum, Closet Wall, Light Blue, Classroom 003
- Wood, Door Frame, White, Classroom 003
- Wood, Baseboard, White, Classroom 003
- Wood, Window Stool (Old), White, Classroom 003
- Wood, Window Stool, White, Classroom 003
- Wood, Door, Brown, Classroom 003
- Wood, Door Frame, White, Classroom 003
- Gypsum, Wall (A), Blue, Toilet D
- Gypsum, Wall (B), Blue, Toilet D
- Gypsum, Wall (C), Blue, Toilet D
- Gypsum, Wall (D), Blue, Toilet D
- Wood, Window Frame (Old), Blue, Toilet D
- Ceramic, Wall Tile, White, Toilet D
- Ceramic, Sink, White, Toilet D

- Ceramic, Toilet 1, White, Toilet D
- Ceramic, Toilet 2, White, Toilet D
- Wood, Door, White, Toilet D
- Wood, Door Frame, White, Toilet D
- Ceramic, 2"x2" Floor Tiles, White, Toilet D
- Ceramic, 1"x1" Floor Tiles, White, Toilet D
- Gypsum, Ceiling, Blue, Toilet D
- Plaster, Wall (B), Yellow, Classroom 004
- Plaster, Wall (D), Yellow, Classroom 004
- Wood, Window Frame (old), White, Classroom 004
- Wood, Window Stool, White, Classroom 004
- Gypsum, Ceiling, White, Classroom 004

Lead amounts greater than or equal to 1.0 mg/cm² have been identified in the components listed below:

- Wood, Window Frame (Inner), White, Toilet B
- Plaster, Wall (B), Light Blue, Classroom 001
- Plaster, Wall (B), Light Blue, Classroom 001
- Wood, Window Frame, White, Classroom 001
- Wood, Window Stool, White, Classroom 001
- Wood, Window Frame, White, Classroom 001
- Wood, Window Stool, White, Classroom 001
- Plaster, Wall (D), Yellow, Classroom 002
- Wood, Panel to Fire Alarm, Yellow, Classroom 002
- Wood, Window Frame, White, Classroom 002
- Wood, Wall (D), Yellow, Classroom 002A
- Wood, Window Frame (Inner), White, Classroom 002A
- Wood, Window Frame (Old), Brown, Classroom 002B
- Wood, Window Stool (Old), Light Blue, Classroom 002B
- Wood, Door Frame, Brown, Classroom 002B
- Plaster, Wall (D), Light Blue, Classroom 003
- Plaster, Wall (B), Light Blue, Classroom 003
- Metal, Window Sash, White, Classroom 003
- Metal, Window Frame, White, Classroom 003
- Plaster, Ceiling, White, Classroom 003
- Wood, Window Stool (Old), White, Classroom 003
- Wood, Window Frame (Old), Blue, Toilet D
- Plaster, Wall (B), Yellow, Classroom 004
- Plaster, Wall (D), Yellow, Classroom 004
- Wood, Window Frame (old), White, Classroom 004

All other surfaces and components tested for lead-based paint were below 1.0 mg/cm². All workers involved in construction and demolition activities are covered under The OSHA Lead Exposure in Construction Rule (29 CFR 1926.62). OSHA requires Lead in Construction training for personnel that handle materials containing lead in any amount. This standard requires workers to be trained and protected from lead exposure by use of engineering controls, respiratory protection, protective clothing and medical surveillance when airborne concentration of lead exceed established personal exposure limit (PEL) levels.

Complete Lead XRF Results are located in Appendix D.

Please reference Enviroscience Consultants, LLC. certifications in Appendix F.

Appendix A
Asbestos Bulk Sample Results

ELAP # 11681; NVLAP Lab Code 200531-0

37 Moore Ave., Mt. Kisco, NY 10549 T: 914.864.1699

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/11/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/19/2022
JOB #:	21819	AREA:	Early Childhood Program
PAGE #:	1 of 6	SAMPLER:	Drew Cheskin
		CUSTODY #:	32079

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
01-01	12"x12" Floor Tile	Beige	Office 001	None Detected by TEM	None Detected	None Detected	97.5% organics and carbonates 2.5% silicates and opaques
01-02	12"x12" Floor Tile	Beige	Office 002	None Detected by TEM	None Detected	None Detected	97.8% organics and carbonates 2.2% silicates and opaques
02-03	Mastic to 12"x12" Beige Floor Tile	Black	Office 001	None Detected by TEM	None Detected	None Detected	90.1% organics and carbonates 9.9% silicates and opaques
02-04	Mastic to 12"x12" Beige Floor Tile	Black	Office 002	None Detected by TEM	None Detected	None Detected	95.5% organics and carbonates 4.5% silicates and opaques
03-05	12"x12" Floor Tile	Green	Classroom 001	None Detected by TEM	None Detected	None Detected	90.8% organics and carbonates 9.2% silicates and opaques
03-06	12"x12" Floor Tile	Green	Classroom 001	None Detected by TEM	None Detected	None Detected	91.3% organics and carbonates 8.7% silicates and opaques
04-07	Mastic to 12"x12" Green Floor Tile	Brown	Classroom 001	None Detected by TEM	None Detected	None Detected	66.7% organics and carbonates 33.3% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 Analyzed by: *John A. Speltz* Date Analyzed: 1/27/2022

ELAP # 11681; NVLAP Lab Code 200531-0

37 Moore Ave., Mt. Kisco, NY 10549 T: 914.864.1699

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/11/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/19/2022
JOB #:	21819	AREA:	Early Childhood Program
PAGE #:	2 of 6	SAMPLER:	Drew Cheskin
		CUSTODY #:	32079

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
04-08	Mastic to 12"x12" Green Floor Tile	Brown	Classroom 001	None Detected by TEM		None Detected	60.7% organics and carbonates 39.3% silicates and opaques
05-09	9"x9" Floor Tile	Red	Classroom 002B	10.5% Asbestos	10.5% Chrysotile	None Detected	42.1% organics and carbonates 47.4% silicates and opaques
05-10	9"x9" Floor Tile	Red	Classroom 002B	9.0% Asbestos	9.0% Chrysotile	None Detected	39.1% organics and carbonates 51.9% silicates and opaques
06-11	Mastic to 9"x9" Red Floor Tile	Black	Classroom 002B	3.4% Asbestos	3.4% Chrysotile	None Detected	84.8% organics and carbonates 11.8% silicates and opaques
06-12	Mastic to 9"x9" Red Floor Tile	Black	Classroom 002B	0.4% Asbestos by TEM	0.4% Chrysotile by TEM	None Detected	91.1% organics and carbonates 8.5% silicates and opaques
07-13	12"x12" Floor Tile	White	Classroom 002B	None Detected by TEM		None Detected	78.6% organics and carbonates 21.4% silicates and opaques
07-14	12"x12" Floor Tile	White	Classroom 002B	None Detected by TEM		None Detected	86.9% organics and carbonates 13.1% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 Analyzed by: *John A. Speltz* Date Analyzed: 1/27/2022

ELAP # 11681; NVLAP Lab Code 200531-0

37 Moore Ave., Mt. Kisco, NY 10549 T: 914.864.1699

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/11/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/19/2022
JOB #:	21819	AREA:	Early Childhood Program
PAGE #:	3 of 6	SAMPLER:	Drew Cheskin
		CUSTODY #:	32079

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
08-15	Mastic to 12"x12" White Floor Tile	Brown	Classroom 002B	None Detected by TEM	None Detected	None Detected	64.3% organics and carbonates 35.7% silicates and opaques
08-16	Mastic to 12"x12" White Floor Tile	Brown	Classroom 002B	None Detected by TEM	None Detected	None Detected	65.0% organics and carbonates 35.0% silicates and opaques
09-17	12"x12" Floor Tile	Cream	Toilet A (Near Offices)	None Detected by TEM	None Detected	None Detected	98.3% organics and carbonates 1.7% silicates and opaques
09-18	12"x12" Floor Tile	Cream	Toilet A (Near Offices)	None Detected by TEM	None Detected	None Detected	98.1% organics and carbonates 1.9% silicates and opaques
10-19	Mastic to 12"x12" Cream Floor Tile	Brown	Toilet A (Near Offices)	None Detected by TEM	None Detected	None Detected	60.5% organics and carbonates 39.5% silicates and opaques
10-20	Mastic to 12"x12" Cream Floor Tile	Brown	Toilet A (Near Offices)	None Detected by TEM	None Detected	None Detected	60.2% organics and carbonates 39.8% silicates and opaques
11-21	Vinyl Cove Base Mastic	Cream	Toilet A (Near Offices)	None Detected by TEM	None Detected	None Detected	48.1% organics and carbonates 51.9% silicates and opaques

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 Analyzed by: *John A. Speltz* Date Analyzed: 1/27/2022

ELAP # 11681; NVLAP Lab Code 200531-0

37 Moore Ave., Mt. Kisco, NY 10549 T: 914.864.1699

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/11/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/19/2022
JOB #:	21819	AREA:	Early Childhood Program
PAGE #:	4 of 6	SAMPLER:	Drew Cheskin
		CUSTODY #:	32079

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
11-22	Vinyl Cove Base Mastic	Cream	Toilet A (Near Offices)	None Detected by TEM	None Detected	None Detected	53.1% organics and carbonates 46.9% silicates and opaques
12-23	Ceramic Wall Tile Grout	White	Toilet B (In Classroom 001)	None Detected	2.0% Cellulose	98.0% silicates and carbonates	
12-24	Ceramic Wall Tile Grout	White	Toilet B (In Classroom 001)	None Detected	2.0% Cellulose	98.0% silicates and carbonates	
13-25	Ceramic Wall Tile Backing	Cream	Toilet B (In Classroom 001)	None Detected	5.0% Cellulose	95.0% silicates and carbonates	
13-26	Ceramic Wall Tile Backing	Cream	Toilet B (In Classroom 001)	None Detected	5.0% Cellulose	95.0% silicates and carbonates	
14-27	Ceramic Wall Tile Mastic	Brown	Toilet C (In Classroom 002)	None Detected by TEM	None Detected	67.6% organics and carbonates 32.4% silicates and opaques	
14-28	Ceramic Wall Tile Mastic	Brown	Toilet C (In Classroom 002)	None Detected by TEM	None Detected	65.8% organics and carbonates 34.2% silicates and opaques	

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-fragile organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 Analyzed by: *John A. Speltz* Date Analyzed: 1/27/2022

ELAP # 11681; NVLAP Lab Code 200531-0

37 Moore Ave., Mt. Kisco, NY 10549 T: 914.864.1699

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/11/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/19/2022
JOB #:	21819	AREA:	Early Childhood Program
PAGE #:	5 of 6	SAMPLER:	Drew Cheskin
		CUSTODY #:	32079

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
15-29	1"x1" Ceramic Floor Tile Mortar	Gray	Toilet C (In Classroom 002)	None Detected	3.0% Cellulose	97.0% Cement	
15-30	1"x1" Ceramic Floor Tile Mortar	Gray	Toilet D (In Classroom 003)	None Detected	3.0% Cellulose	97.0% Cement	
16-31	Ceramic Wall Tile Backing	Cream	Toilet D (In Classroom 003)	None Detected by TEM	None Detected	89.5% organics and carbonates 10.5% silicates and opaques	
16-32	Ceramic Wall Tile Backing	Cream	Toilet D (In Classroom 003)	None Detected by TEM	None Detected	87.5% organics and carbonates 12.5% silicates and opaques	
17-33	Ceramic Wall Tile Grout	White	Toilet D (In Classroom 003)	None Detected	2.0% Cellulose	98.0% silicates and carbonates	
17-34	Ceramic Wall Tile Grout	White	Toilet D (In Classroom 003)	None Detected	2.0% Cellulose	98.0% silicates and carbonates	
18-35	2"x2" Ceramic Floor Tile Mortar	White	Toilet D (In Classroom 003)	None Detected	3.0% Cellulose	97.0% Cement	

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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 Analyzed by: John A. Speltz Date Analyzed: 1/27/2022

ELAP # 11681; NVLAP Lab Code 200531-0

37 Moore Ave., Mt. Kisco, NY 10549 T: 914.864.1699

ASBESTOS BULK SAMPLE RESULTS

CLIENT:	Greenburgh Central School District 475 West Hartsdale Avenue, Hartsdale, NY 10530	SAMPLE DATE:	1/11/2022
PROJECT NAME:	District Wide Asbestos & Lead Inspections - January 2021	DATE RECEIVED:	1/19/2022
JOB #:	21819	AREA:	Early Childhood Program
PAGE #:	6 of 6	SAMPLER:	Drew Cheskin
		CUSTODY #:	32079

Sample #	Description	Color	Location	Result	% Asbestos-type	% Non-asbestos Fibers-type	% Matrix-type
18-36	2"x2" Ceramic Floor Tile Mortar	White	Toilet D (In Classroom 003)	None Detected		3.0% Cellulose	97.0% Cement

Method: EPA 600/M4-82/20, 600/R-93/116; NYS DOH ELAP Item 198.1, 198.4, 198.6, 198.8.

ACM: Asbestos Containing Materials contain more than 1%.

None Detected - No asbestos found in samples using polarized light microscopy (PLM). Trace - Asbestos found is 1% or less; not considered ACM.

None Detected by TEM - No asbestos found in samples using transmission electron microscopy (TEM) and polarized light microscopy (PLM) was found to be negative.

Negative by Weight - After matrix reduction, the remainder is less than 1% and, therefore, cannot fulfill the definition of asbestos containing material.

Inconclusive - No asbestos found in non-friable organically bound samples using polarized light microscopy (PLM).

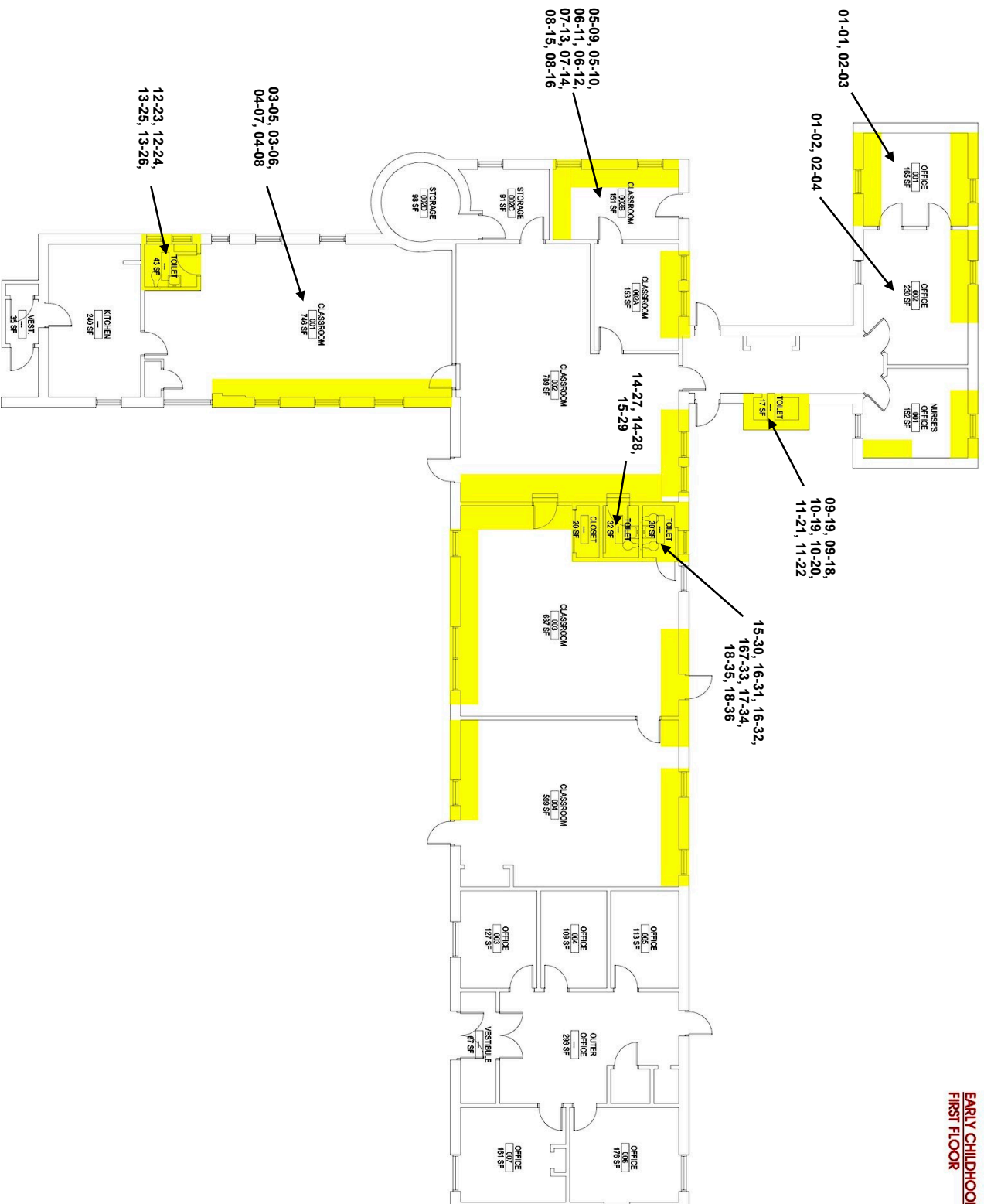
Method ELAP 198.6 does not remove vermiculite and may underestimate the level of asbestos present in a sample containing greater than 10% vermiculite. Samples of Surface Material that contain Vermiculite are analyzed by ELAP 198.8 for conclusive result.

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Analyzed by: *John A. Speltz* Date Analyzed: 1/27/2022

Appendix B
Asbestos Bulk Sample Location Drawings

**EARLY CHILDHOOD PROGRAM
FIRST FLOOR**



<p>ENVIROSCIENCE CONSULTANTS, INC. 2150 SMITHTOWN AVENUE HONKONKOWIA, NY 11779 (631) 580-3191 FAX 580-3195 www.envirohealth.org</p>	<p>KEY PLAN NO SCALE</p>	<p>PROJECT DISTRICT WIDE ASBESTOS & LEAD INSPECTIONS GREENBURGH CENTRAL SCHOOL DISTRICT 475 WEST HARTSDALE AVENUE HARTSDALE, NY 10607</p>	<p>PROJECT #: 21819 COMMENTS: EARLY CHILDHOOD PROGRAM FIRST FLOOR BULK SAMPLE LOCATION PLAN</p>	<p>NOT TO SCALE Date: 03/08/2022 By: Drew Cheskin DRAWING 1 of 1</p>
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Appendix C
Asbestos Containing Materials Location Drawings


**EARLY CHILDHOOD CENTER
FIRST FLOOR**

Location of Asbestos Containing 9"x9" Floor Tiles

Location of Asbestos Containing 12"x12" Floor Tiles

Rooms and Areas:

- OFFICE 001 (182 SF)
- OFFICE 002 (230 SF)
- OFFICE 003 (183 SF)
- TOILET 004 (17 SF)
- CLASSROOM 005 (151 SF)
- CLASSROOM 006 (153 SF)
- CLASSROOM 007 (189 SF)
- STORAGE 008 (91 SF)
- STORAGE 009 (88 SF)
- CLASSROOM 010 (749 SF)
- TOILET 011 (43 SF)
- KITCHEN 012 (240 SF)
- VEST 013 (34 SF)
- TOILET 014 (31 SF)
- TOILET 015 (32 SF)
- CLOSET 016 (20 SF)
- CLASSROOM 017 (887 SF)
- CLASSROOM 018 (889 SF)
- OFFICE 019 (113 SF)
- OFFICE 020 (105 SF)
- OFFICE 021 (127 SF)
- OUTR. OFFICE 022 (283 SF)
- VESTIBULE 023 (87 SF)
- OFFICE 024 (170 SF)
- OFFICE 025 (181 SF)

<div><div>ENVIROSCIENCE CONSULTANTS, INC. 2150 SMITHTOWN AVENUE FONDKONKOMA, NY 11779 (631) 580-3191 FAX 580-3195 www.envirohealth.org</div></div>	ENVIROSCIENCE CONSULTANTS, INC. 2150 SMITHTOWN AVENUE FONDKONKOMA, NY 11779 (631) 580-3191 FAX 580-3195 www.envirohealth.org		KEY PLAN NO SCALE	PROJECT	DISTRICT WIDE ASBESTOS & LEAD INSPECTIONS	CLIENT GREENBURGH CENTRAL SCHOOL DISTRICT 475 WEST HARTSDALE AVENUE HARTSDALE, NY 10607	PROJECT # : 21819 COMMENTS: EARLY CHILDHOOD PROGRAM FIRST FLOOR ASBESTOS CONTAINING MATERIALS LOCATION PLAN	NOT TO SCALE Date: 03/09/2022 By: Drew Cheskin
	DRAWING 1 of 1							

Appendix D
Lead XRF Results

Lead XRF Inspection Report

Client: Greenburgh Central School District

Date: January 11, 2022

Project: Early Childhood Program

Job #: 21819

Inspector Name: Drew Cheskin

Signature: *Drew Cheskin*

XRF Serial Number: 26952

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm ²	Classification
809	-	-	-	Calibration Check	1.10	-
810	-	-	-	Calibration Check	1.20	-
811	-	-	-	Calibration Check	1.10	-
812	Wood	Window Frame	White	Office 001	0.02	Negative
813	Wood	Window Stool	White	Office 001	0.03	Negative
814	Wood	Window Frame	White	Office 001	0.06	Negative
815	Wood	Window Stool	White	Office 001	0.02	Negative
816	Wood	Ext. Window Frame	Brown	Office 001	0.02	Negative
817	Wood	Ext. Window Sill	Brown	Office 001	0.01	Negative
818	Stucco	Ext. Window Sill	Beige	Office 001	0.01	Negative
819	Wood	Window Frame	White	Office 002	0.06	Negative
820	Wood	Window Stool	White	Office 002	0.06	Negative
821	Wood	Wall Panel (D)	Light Blue	Office 002	0.00	Negative
822	Wood	Window Frame	White	Nurse's Office	0.01	Negative
823	Wood	Window Stool	White	Nurse's Office	0.01	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm ²	Classification
824	Wood	Wall Panel (C)	Light Blue	Nurse's Office	0.00	Negative
825	Wood	Ext. Window Frame	Brown	Nurse's Office	0.00	Negative
826	Wood	Ext. Window Sill	Brown	Nurse's Office	0.04	Negative
827	Stucco	Ext. Window Sill	Beige	Nurse's Office	0.00	Negative
828	Wood	Wall Panel (D)	Light Blue	Nurse's Office	0.00	Negative
829	Wood	Wall Panel (A)	White	Toilet A	0.00	Negative
830	Wood	Wall Panel (B)	White	Toilet A	0.00	Negative
831	Wood	Wall Panel (C)	White	Toilet A	0.00	Negative
832	Wood	Wall Panel (D)	White	Toilet A	0.00	Negative
833	Wood	Door	White	Toilet A	0.00	Negative
834	Wood	Door Frame	White	Toilet A	0.01	Negative
835	Wood	Window Frame	White	Toilet A	0.00	Negative
836	Metal	Radiator Cover	White	Toilet A	0.00	Negative
837	Ceramic	Sink	White	Toilet A	0.01	Negative
838	Ceramic	Toilet	White	Toilet A	0.00	Negative
839	Gypsum	Ceiling	White	Toilet A	0.00	Negative
840	Gypsum	Wall Panel (A)	Yellow	Toilet B	0.00	Negative
841	Gypsum	Wall Panel (B)	Yellow	Toilet B	0.00	Negative
842	Gypsum	Wall Panel (C)	Yellow	Toilet B	0.00	Negative
843	Gypsum	Wall Panel (D)	Yellow	Toilet B	0.00	Negative
844	Wood	Door	White	Toilet B	0.00	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm ²	Classification
845	Wood	Door Frame	White	Toilet B	0.00	Negative
846	Gypsum	Wall	Light Blue	Toilet B	0.00	Negative
847	Wood	Window Frame (Inner)	White	Toilet B	21.30	Positive
848	Wood	Window Frame (Outer)	White	Toilet B	0.00	Negative
849	Wood	Window Stool	White	Toilet B	0.00	Negative
850	Wood	Radiator Cover	White	Toilet B	0.00	Negative
851	Ceramic	Toilet	White	Toilet B	0.50	Negative
852	Plaster	Wall (B)	Light Blue	Classroom 001	18.50	Positive
853	Plaster	Wall (B)	Light Blue	Classroom 001	23.50	Positive
854	Brick	Wall (B)	Light Blue	Classroom 001	-0.82	Negative
855	Wood	Window Frame	White	Classroom 001	0.00	Negative
856	Wood	Window Stool	White	Classroom 001	-0.87	Negative
857	Wood	Window Frame	White	Classroom 001	5.60	Positive
858	Wood	Window Stool	White	Classroom 001	17.10	Positive
859	Wood	Window Frame	White	Classroom 001	8.40	Positive
860	Wood	Window Stool	White	Classroom 001	6.00	Positive
861	Wood	Window Frame	White	Classroom 001	0.00	Negative
862	Wood	Window Stool	White	Classroom 001	0.00	Negative
863	Wood	Radiator Cover	White	Classroom 001	0.00	Negative
864	Wood	Radiator Cover	White	Classroom 001	0.00	Negative
865	Wood	Radiator Cover	White	Classroom 001	0.00	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm ²	Classification
866	Wood	Pipe Chase	Light Blue	Classroom 001	0.00	Negative
867	Wood	Baseboard	White	Classroom 001	0.05	Negative
868	Plaster	Wall (D)	Yellow	Classroom 002	21.40	Positive
869	Wood	Panel to Fire Alarm	Yellow	Classroom 002	3.00	Positive
870	Metal	Conduit	Yellow	Classroom 002	0.00	Negative
871	Gypsum	Door Framing	Yellow	Classroom 002	0.00	Negative
872	Wood	Door	White	Classroom 002	0.00	Negative
873	Wood	Door Frame	White	Classroom 002	0.00	Negative
874	Concrete	Steps	Yellow	Classroom 002	0.01	Negative
875	Metal	Railing	Black	Classroom 002	0.00	Negative
876	Wood	Wall Panel	Yellow	Classroom 002	0.00	Negative
877	Plaster	Wall (C)	Yellow	Classroom 002	-0.69	Negative
878	Wood	Window Frame	White	Classroom 002	33.70	Positive
879	Gypsum	Wall (A)	Blue	Toilet C	0.60	Negative
880	Gypsum	Wall (B)	Blue	Toilet C	0.00	Negative
881	Gypsum	Wall (C)	Blue	Toilet C	0.02	Negative
882	Gypsum	Wall (D)	Blue	Toilet C	0.00	Negative
883	Wood	Door	White	Toilet C	0.00	Negative
884	Wood	Door Frame	White	Toilet C	0.00	Negative
885	Ceramic	Sink	White	Toilet C	0.00	Negative
886	Ceramic	Toilet	White	Toilet C	0.01	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm ²	Classification
887	Gypsum	Ceiling	Blue	Toilet C	0.00	Negative
888	Wood	Steps	Yellow	To Toilet C	0.00	Negative
889	Wood	Steps	Brown	To Toilet C	0.00	Negative
890	Wood	Wall (D)	Yellow	Classroom 002A	1.70	Positive
891	Wood	Window Frame (Inner)	White	Classroom 002A	24.90	Positive
892	Wood	Window Frame (Outer)	White	Classroom 002A	0.00	Negative
893	Wood	Window Stool	White	Classroom 002A	0.00	Negative
894	Wood	Window Frame (Old)	Brown	Classroom 002B	4.30	Positive
895	Wood	Window Stool	Light Blue	Classroom 002B	0.29	Negative
896	Wood	Wall Panel (C)	Light Blue	Classroom 002B	0.00	Negative
897	Wood	Window Stool (Old)	Light Blue	Classroom 002B	20.50	Positive
898	Wood	Door	Brown	Classroom 002B	0.01	Negative
899	Wood	Door Frame	Brown	Classroom 002B	23.60	Positive
900	Wood	Wall Panel (B)	Light Blue	Classroom 002B	-0.30	Negative
901	Metal	Radiator Cover	Light Blue	Classroom 002B	0.02	Negative
902	Plaster	Wall (D)	Light Blue	Classroom 003	5.30	Positive
903	Plaster	Wall (B)	Light Blue	Classroom 003	1.20	Positive
904	Wood	Window Frame	White	Classroom 003	0.00	Negative
905	Wood	Window Stool	White	Classroom 003	0.00	Negative
906	Metal	Window Sash	White	Classroom 003	8.00	Positive
907	Metal	Window Frame	White	Classroom 003	8.80	Positive

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm ²	Classification
908	Plaster	Ceiling	White	Classroom 003	8.60	Positive
909	Gypsum	Closet Wall	Light Blue	Classroom 003	0.00	Negative
910	Wood	Door Frame	White	Classroom 003	0.00	Negative
911	Wood	Baseboard	White	Classroom 003	0.00	Negative
912	Wood	Window Stool (Old)	White	Classroom 003	10.60	Positive
913	Wood	Window Stool	White	Classroom 003	0.00	Negative
914	Wood	Door	Brown	Classroom 003	0.00	Negative
915	Wood	Door Frame	White	Classroom 003	0.00	Negative
916	Gypsum	Wall (A)	Blue	Toilet D	0.00	Negative
917	Gypsum	Wall (B)	Blue	Toilet D	0.00	Negative
918	Gypsum	Wall (C)	Blue	Toilet D	0.00	Negative
919	Gypsum	Wall (D)	Blue	Toilet D	0.00	Negative
920	Wood	Window Frame (Old)	Blue	Toilet D	14.90	Positive
921	Ceramic	Wall Tile	White	Toilet D	0.01	Negative
922	Ceramic	Sink	White	Toilet D	0.00	Negative
923	Ceramic	Toilet 1	White	Toilet D	0.01	Negative
924	Ceramic	Toilet 2	White	Toilet D	0.07	Negative
925	Wood	Door	White	Toilet D	0.00	Negative
926	Wood	Door Frame	White	Toilet D	0.00	Negative
927	Ceramic	2"x2" Floor Tiles	White	Toilet D	0.01	Negative
928	Ceramic	1"x1" Floor Tiles	White	Toilet D	0.01	Negative

Sample ID #	Substrate	Component	Color	Test Location	XRF mg/cm ²	Classification
929	Gypsum	Ceiling	Blue	Toilet D	0.00	Negative
930	Plaster	Wall (B)	Yellow	Classroom 004	4.00	Positive
931	Plaster	Wall (D)	Yellow	Classroom 004	4.20	Positive
932	Wood	Window Frame (old)	White	Classroom 004	10.80	Positive
933	Wood	Window Stool	White	Classroom 004	0.00	Negative
934	Gypsum	Ceiling	White	Classroom 004	0.00	Negative
935	-	-	-	Calibration Check	1.20	-
936	-	-	-	Calibration Check	1.00	-
937	-	-	-	Calibration Check	1.10	-

Appendix E

Photo Log



Asbestos containing 9"x9" Blue & White Floor Tiles and Mastic



Asbestos containing 9"x9" Floor Tiles, Red & Mastic underneath non-asbestos containing 12"x12" Floor Tile, White & Mastic.

Appendix F

Certifications

New York State – Department of Labor

Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

Enviroscience Consultants, LLC

2150 Smithtown Avenue

Ronkonkoma, NY 11779

FILE NUMBER: 99-0882

LICENSE NUMBER: 28733

LICENSE CLASS: RESTRICTED

DATE OF ISSUE: 11/15/2021


EXPIRATION DATE: 11/30/2022

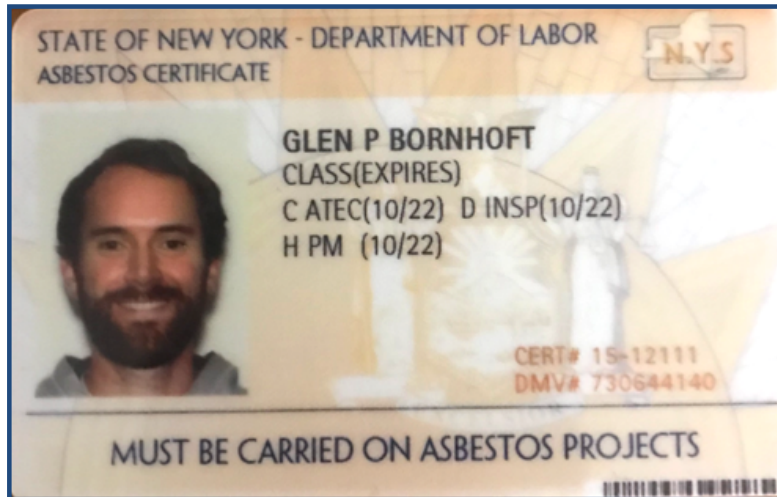
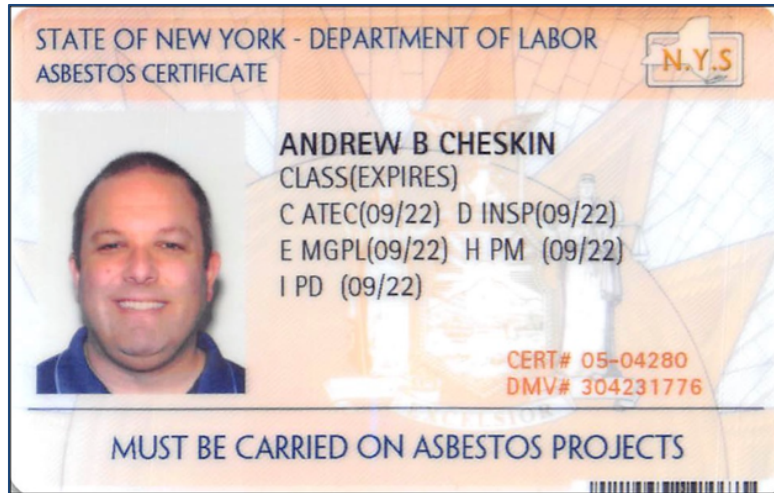
Duly Authorized Representative – Glenn Neuschwender:

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

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

SH 432 (8/12)


Amy Phillips, Director
For the Commissioner of Labor



United States Environmental Protection Agency

This is to certify that

Enviroscience Consultants, Inc.

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

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires May 28, 2022

LBP-1327-1

Certification #

January 29, 2019

Issued On



Michelle Price

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that

Andrew B Cheskin

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

Risk Assessor

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires August 06, 2024



LBP-R-11931-2

Certification #

August 02, 2021

Issued On



Ben Conetta

Ben Conetta, Chief

Chemicals and Multimedia Programs Branch

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2022
Issued April 01, 2021
Revised October 19, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. GLENN L. NEUSCHWENDER
ENVIROSCIENCE CONSULTANTS, LLC
2150 SMITHTOWN AVENUE SUITE 3
RONKONKOMA, NY 11779

NY Lab Id No: 11681

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

Miscellaneous

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



Serial No.: 63960

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

Page 1 of 1

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Enviroscience Consultants, LLC
2150 Smithtown Ave.
Suite 3
Ronkonkoma, NY 11779
Mr. Edward Detweiler
Phone: 631-580-3191 Fax: 631-580-3195
Email: edetweiler@envirohealth.org
<http://www.envirohealth.org>

ASBESTOS FIBER ANALYSIS


NVLAP LAB CODE 200531-0

Bulk Asbestos Analysis

<u>Code</u>	<u>Description</u>
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

<u>Code</u>	<u>Description</u>
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



For the National Voluntary Laboratory Accreditation Program

Effective 2021-10-01 through 2022-09-30

Page 1 of 1

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200531-0


Enviroscience Consultants, LLC
Ronkonkoma, NY

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2021-10-18 through 2022-09-30
Effective Dates



For the National Voluntary Laboratory Accreditation Program

GREENBURGH CENTRAL SCHOOL DISTRICT BID PROPOSAL FORM
May 27, 2022

Phase 1 Capital Projects at Highview ES; Lee F Jackson ES; RJ Bailey ES; Woodlands Jr Sr High School; Early Childhood Program

NAME OF BIDDER: _____

BUSINESS ADDRESS: _____

TELEPHONE NUMBER: _____ **DATE OF BID:** _____

The bidder mentioned above declares and certifies:

First: That said bidder is of lawful age and the only one interested in this bid, and that no one other than said bidder has any interest herein.

Second: That this bid is made without any previous understanding, agreement, or connection with any other person, firm, or corporation making a bid for the same purpose, and is in all respects fair and without collusion or fraud.

Third: That no member of the Board of Education of the **Greenburgh CSD, Town of Greenburgh**, New York, nor any officer or employee or person whose salary is payable as a whole or in part from the treasury of said Board of Education is directly or indirectly interested in this bid or in the supplies, materials, equipment, work, or services to which it relates, or in any portion of the profits thereof.

Fourth: That said bidder has carefully examined the Instruction to Bidders, schedules, and specifications prepared under the direction of the Board of Education, and will, if successful in this bid, furnish and deliver at the prices bid and within the time stated, all materials, supplies, apparatus, goods, wares, merchandise, services, or labor for which this bid is made.

Fifth: That the prices quoted are exclusive of all federal, state, and municipal sales and excise taxes.

Sixth: The undersigned further declares that he has received and examined the following addenda:

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

Addendum No. _____ Dated: _____

May 27, 2022

FOR PROPOSAL FORM TO BE VALID, ALL PAGES OF THE PROPOSAL FORM
MUST BE DULY EXECUTED.

Seventh: The Bidder shall check here _____ if the bid has been based upon equivalents in lieu of any kind, type, brand, or manufacturer of material other than those named in the specifications. If checked, the Bidder shall submit the Equivalency Form in accordance with Instructions to Bidders, Paragraph 7B. This item in no way prohibits the Bidder from submitting equivalents after the award of contract.

Eighth: The undersigned further understands and agrees that he is to furnish all labor, materials, equipment, supplies, and other facilities and things necessary and required for the execution and completion of:

**Phase 1 Capital Projects at
Highview ES; Lee F Jackson ES; RJ Bailey ES; Woodlands Jr Sr High
School; Early Childhood Program**

in strict accordance with the contract documents:

BASE BID GC-1 - General Construction
Highview ES Roof Reconstruction

The contractor shall state complete price to provide all labor, equipment and material as required to perform all work, including but not limited to, general construction roof replacement. Inclusive of asbestos abatement.

Base Bid Highview ES roof only \$ _____

Lump Sum Allowance for unforeseen
Additional asbestos abatement: \$ _____ 10,000

Lump Sum Allowance for
unforeseen conditions: \$ _____ 10,000

Subtotal: \$ _____

May 27, 2022

TOTAL GENERAL CONSTRUCTION PRICE = \$ _____
Inclusive of allowance\$ _____
Total GC-1 Bid price written in words**BASE BID GC-2 - General Construction All Schools**

The contractor shall state complete price to provide all labor, equipment and material as required to perform all work, including but not limited to, general construction. Inclusive of asbestos abatement.

Base Bid Highview ES \$ _____

Base Bid Lee F Jackson ES \$ _____ N/A

Base Bid RJ Bailey ES \$ _____

Base Bid Woodlands MSHS \$ _____

Base Bid Early Childhood Program \$ _____

Lump Sum Allowance for unforeseen
Additional asbestos abatement: \$ _____ 25,000Lump Sum Allowance for
unforeseen conditions: \$ _____ 25,000

Subtotal: \$ _____

TOTAL GENERAL CONSTRUCTION PRICE = \$ _____
Inclusive of allowance\$ _____
Total GC-1 Bid price written in words**BASE BID EC-1 - Electrical Construction All Schools**

The contractor shall state complete price to provide all labor, equipment and material as required to perform all work, including but not limited to, electrical construction.

GREENBURGH CENTRAL SCHOOL DISTRICT**BID PROPOSAL FORM****May 27, 2022**

Base Bid Highview ES \$ _____ N/A

Base Bid Lee F Jackson ES \$ _____

Base Bid RJ Bailey ES \$ _____

Base Bid Woodlands MSHS \$ _____ N/A

Base Bid Early Childhood Program \$ _____

Lump Sum Allowance for
unforeseen conditions: \$ _____ 12,000

Subtotal: \$ _____

TOTAL ELECTRICAL CONSTRUCTION PRICE =\$ _____
Inclusive of allowance\$ _____
Total EC-1 Bid price written in words**BASE BID MC-1 - Mechanical Construction All
Schools**

The contractor shall state complete price to provide all labor, equipment and material as required to perform all work, including but not limited to, mechanical construction.

Base Bid Highview ES \$ _____

Base Bid Lee F Jackson ES \$ _____

Base Bid RJ Bailey ES \$ _____

Base Bid Woodlands MSHS \$ _____

Base Bid Early Childhood Program \$ _____

Lump Sum Allowance for
unforeseen conditions: \$ _____ 20,000

Subtotal: \$ _____

TOTAL MECHANICAL CONSTRUCTION PRICE =\$ _____
Inclusive of allowance

\$ _____
Total MC-1 Bid price written in words

BASE BID PC-1 - Plumbing Construction All Schools

The contractor shall state complete price to provide all labor, equipment and material as required to perform all work, including but not limited to, plumbing construction.

Base Bid Highview ES \$ _____ N/A

Base Bid Lee F Jackson ES \$ _____ N/A

Base Bid RJ Bailey ES \$ _____ N/A

Base Bid Woodlands MSHS \$ _____ N/A

Base Bid Early Childhood Program \$ _____

Lump Sum Allowance for
unforeseen conditions: \$ _____ 10,000

Subtotal: \$ _____

TOTAL PLUMBING CONSTRUCTION PRICE = \$ _____
Inclusive of allowance

\$ _____
Total PC-1 Bid price written in words

The Board of Education hereby reserves the right to accept or reject any item set forth individually in Paragraph Eight above. The Owner may determine the lowest bid by adding one base bid to other base bid(s) and/or by adding to or deducting from those base bid(s), additive or deduct alternates, unit prices, or substitutions, if any, which the Owner elects to accept after the opening of bids.

Ninth: BID SECURITY

GREENBURGH CENTRAL SCHOOL DISTRICT**BID PROPOSAL FORM****May 27, 2022**

Each bidder shall deposit with his bid a bid bond, bank draft, or certified check in the amount of not less than five percent (5%) of the Base Bid made payable to:

Board of Education, Greenburgh Central School District in the amount:

_____ \$(_____)

AND agrees such surety shall be a measure of liquidated damages should he default in delivery of agreement.

Tenth: **COMPLETION** (Contractor shall fill in number of days)

It is intended that the work under this contract be completed substantially within _____ consecutive calendar days after receipt of authorized letter of intent issued by the District.

Eleventh: **NON-COLLUSIVE BIDDING CERTIFICATION**

General Municipal Law, Section 103-d
(Submit with Bid Proposal Form)

A. By submission of this bid, the bidder and each person signing on behalf of the bidder certifies, and if this is a joint bid each party hereto certifies as to its own organization, under penalty of perjury that to the best of the bidder's knowledge and belief:

1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and
3. No attempt has been made or will be made by the bidder to induce any other person, partnership, or corporation to submit a bid for the purpose of restricting competition.

B. A bid shall not be considered for award nor shall

BID PROPOSAL FORM-6

21-188; 21-189; 21-190; 21-191; 21-192 04/27/2022

May 27, 2022

award be made where A-1, 2, and 3 above have not been complied with provided, however, that if in any case the bidder shall so state and shall furnish with a bid a signed statement which sets forth in detail the reasons therefore, where A-1, 2, and 3 above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department agency, or official thereof to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

The fact that the bidder: (a) has published price lists, rates, or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items, or (c) has sold the same items to other customers at the same prices being bid, does not constitute without more, a disclosure within the meaning of Paragraph A above.

- C. If the bidder is a corporation, the corporation shall be deemed to have been authorized by the Board of Directors of the bidder to make the above certification and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

(Seal of Corporation)

Corporate or Company Name

By: _____
Signature Title

Date: _____

Twelfth:

On acceptance of this proposal for said work, the undersigned hereby binds himself or themselves to enter into written contract with the Board of Education within ten (10) days of date of notice of award, and to comply in all respects with the provisions set forth in "Instructions for Bidders" and "General Conditions of Contract" in relation to security for the faithful performance of the terms of said contract.

GREENBURGH CENTRAL SCHOOL DISTRICT BID PROPOSAL FORM
May 27, 2022

IF A CORPORATION (Seal of corporation):

NAME

ADDRESS

President

Secretary

Treasurer

IF A FIRM:

NAME OF MEMBERS

ADDRESS

BID PROPOSAL CERTIFICATION

Firm Name _____

Business Address _____

Telephone Number _____ Date of Bid _____

I. General Bid Certification

The bidder certifies that he will furnish, at the prices herein quoted, the materials, equipment and/or services as proposed on this bid.

II. Non-Collusive Bidding Certification

1. The undersigned declares that (he/she has - they have) examined all aspects of the bid such as the Legal Notice to Bidders, Form of Agreement and Specifications, Information for Bidders/Supplemental Conditions, Bid Proposal Certifications, Statement of Bidder Qualifications, Reference Sheets, Affidavit of Compliance, General Conditions, pricing sheets, and any supplements (all of which are acknowledged as being part of the Contract), as well as all laws, ordinances, and regulations governing the work and (he/she proposes - they propose) to provide all materials, labor and related items necessary for the satisfactory completion of the work strictly in accordance with the documents listed above, and subscribes and affirms as true under penalties of perjury as required under Section 103-d of the General Municipal Law as follows:

Statement of non-collusion in bids and proposals to political subdivision of the state. Every bid or proposal hereafter made to a political subdivision of the state or any public department, agency or official thereof where competitive bidding is required by statute, rule, regulation, or local law, for work or services performed or to be performed or goods sold or to be sold, shall contain the following statement subscribed by the bidder and affirmed by such bidder as true under the penalties of perjury: Non-collusive bidding certification.

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

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

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

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

(b) A bid shall not be considered for award nor shall any award be made when (a) (1) (2) and (3) above have not been complied with; provided: however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where (a) (1) (2) and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department, agency or official thereof to which the bid is made, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

The fact that a bidder (a) has published price lists, rates, or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items,

or (c) has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning subparagraph one (a).

2. Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certification referred to in subdivision one of the section, shall be deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

Signature (Authorized) _____

Title _____

Sworn to before me this

_____ day of _____, 20____

Notary Public

PROPOSED EQUIVALENT FORM

Project: _____

Name of Bidder (Corporate Name): _____

Date: _____ Prime Contract For _____

In accordance with Instructions to Bidders, Article 7, the above listed Bidder proposes the following materials, equipment, or methods for consideration by the Architect as equivalents to those specified or shown in the Contract Documents, and for incorporation into the Work at no additional cost to the Owner. The Contractor is aware of the risk of acceptance.

Project Manual Section Number and Specified Product	Proposed Equivalent
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

PROPOSED SUBSTITUTION FORM

The Base Bid Contract Sum proposed by the undersigned on the preceding Bid Proposal Form is based upon all items exactly as shown and described in the Contract Documents. For the Owner's consideration, the Bidder proposes the following substitute materials, equipment, or methods to be used in the work, in lieu of those specified, with a credit for cost savings to the Owner if accepted. Refer to Article 7(c) of the Instructions to Bidders.

	Specified Product and Section Number	Proposed Substitute	Credit Amount
1.	_____	_____	
	_____	_____	\$ _____
2.	_____	_____	
	_____	_____	\$ _____
3.	_____	_____	
	_____	_____	\$ _____

Name of Bidder (Corporate Name): _____

Date: _____ By: _____
Signature of Corporate Officer

Certification Pursuant to Section 103-g of the New York State General Municipal Law

- A. By submission of this bid/proposal, each bidder/proposer and each person signing on behalf of any bidder/proposer certifies, and in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that each bidder is not on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the New York State Finance Law.
- B. A Bid/Proposal shall not be considered for award, nor shall any award be made where the condition set forth in Paragraph A above has not been complied with; provided, however, that in any case the bidder/proposer cannot make the foregoing certification set forth in Paragraph A above, the bidder/proposer shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefor. Where Paragraph A above cannot be complied with, the Purchasing Unit to the political subdivision, public department, agency or official thereof to which the bid/proposal is made, or his designee, may award a bid/proposal, on a case by case business under the following circumstances:
1. The investment activities in Iran were made before April 12, 2012, the investment activities in Iran have not been expanded or renewed after April 12, 2012, and the Bidder/Proposer has adopted, publicized and is implementing a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran; or
 2. The political subdivision makes a determination that the goods or services are necessary for the political subdivision to perform its functions and that, absent such an exemption, the political subdivision would be unable to obtain the goods or services for which the contract is offered. Such determination shall be made in writing and shall be a public document.

Signature_____ Title_____

Date

Company Name

Sworn to before me this

_____ day of _____, 20____

Notary Public

**DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH
THE IRAN DIVESTMENT ACT**

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed subcontractor is not identified on the Prohibited Entities List. The District reserves the right to undertake any investigation into the information provided herein or to request additional information from the bidder.

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____

Describe the type of activities including but not limited to the amounts and the nature of the investments (e.g. banking, energy, real estate) _____

If so, when did the first investment activity occur? _____

Have the investment activities ended? _____

If so, what was the date of the last investment activity? _____

If not, have the investment activities increased or expanded since April 12, 2012? _____

Has the bidder adopted, publicized, or implemented a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran? _____

If so, provide the date of the adoption of the plan by the bidder and proof of the adopted resolution, if any and a copy of the formal plan. _____

In detail, state the reasons why the bidder cannot provide the Certification of Compliance with the Iran Divestment Act below (additional pages may be attached):

I, _____ being duly sworn, deposes and says that he/she is the _____ of

the _____ Corporation and the foregoing is true and accurate.

SIGNED

SWORN to before me this

_____ day of _____

201____

Notary Public: _____

IRAN DIVESTMENT ACT COMPLIANCE RIDER

FOR SCHOOL DISTRICTS

The Iran Divestment Act of 2012, effective as of April 12, 2012, is codified at State Finance Law (“SFL”) §165-a and General Municipal Law (“GML”) §103-g. The Iran Divestment Act, with certain exceptions, prohibits municipalities, including the District, from entering into contracts with persons engaged in investment activities in the energy sector of Iran. Pursuant to the terms set forth in SFL §165-a and GML §103-g, a person engages in investment activities in the energy sector of Iran if:

- (a) The person provides goods or services of twenty million dollars or more in the energy sector of Iran, including a person that provides oil or liquefied natural gas tankers, or products used to construct or maintain pipelines used to transport oil or liquefied natural gas, for the energy sector of Iran; or
- (b) The person is a financial institution that extends twenty million dollars or more in credit to another person, for forty-five days or more, if that person will use the credit to provide goods or services in the energy sector in Iran and is identified on a list created pursuant to paragraph (b) of subdivision three of Section 165-a of the SFL and maintained by the Commissioner of the Office of General Services.

A bid or proposal shall not be considered for award nor shall any award be made where the bidder or proposer fails to submit a signed and verified bidder’s certification.

Each bidder or proposer must certify that it is not on the list of entities engaged in investment activities in Iran created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the SFL. In any case where the bidder or proposer cannot certify that it is not on such list, the bidder or proposer shall so state and shall furnish with the bid or proposal a signed statement which sets forth in detail the reasons why such statement cannot be made. The District may award a bid to a bidder who cannot make the certificate on a case by case basis if:

- (1) The investment activities in Iran were made before the effective date of this section (i.e., April 12, 2012), the investment activities in Iran have not been expanded or renewed after the effective date of this section and the person has adopted, publicized and is implementing a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran; or
- (2) The District makes a determination that the goods or services are necessary for the District to perform its functions and that, absent an exemption, the District would be unable to obtain the goods or services for which the contract is offered. Such determination shall be made in writing and shall be a public document.

STATEMENT OF BIDDER'S QUALIFICATIONS

Questions may be answered on a separate attached sheet

1. Name of Bidder _____
2. Permanent main office address _____
3. Type of Business Entity _____
4. If the bidder is a corporation, state the date and place of incorporation of the corporation.

5. For how many years has the bidder done business under its present name? _____
6. List the persons who are directors, officers, owners, managerial employees or partners in the bidder's business. _____

7. a. Have any of the persons listed in Number 6 owned/operated/been shareholders in any other companies? If so, please state names(s) of the other company(ies). _____
b. If the answer to number 7a is in the affirmative, list said persons and the names of their previous affiliations.

8. Has any director, owner or managerial employee had any professional license suspended or revoked? If yes, list the name of the individual, the professional license he/she formerly held, whether said license was revoked or suspended and the date of the revocation or suspension.

9. During the five year period preceding the submission of this bid, has the bidder been charged with any claims pertaining to unlawful intimidation or discrimination against any employee by reason of race, creed, color, disability, sex or natural origin and/or violations of an employee's civil rights or equal employment opportunities? If yes, list the persons making such claim against the bidder, a description of the claim, the status of the claim and what disposition (if any) has been made

regarding such claim _____

10. During the five-year period preceding the submission of this bid, has the bidder been named as a party in any lawsuit in an action involving a claim for personal injury or wrongful death arising from performance of work related to any project in which it has been engaged? If yes, list all such lawsuits, the index number associated with said suit and the status of the lawsuit at the time of the submission of this bid. _____
11. During the five-year period preceding the submission of this bid, has the bidder been the subject of proceedings before the Department of Labor for alleged violations of the Labor Law as it relates to the payment of prevailing wages and/or supplemental payment requirements? If yes, please list each such instance and the status of the proceeding at the time of the submission of this bid. _____
12. During the five-year period preceding the bidder's submission of this bid, has the bidder been the subject of proceedings involving allegations that it violated the Workers' Compensation Law including but not limited to the failure to provide proof of workers' compensation or disability coverage and/or any lapses thereof? If yes, list each such instance of violation and the status of the claimed violation at the time of the submission of this bid. _____
13. Has the bidder, its officers, directors, owner and/or managerial employees been convicted of a crime or been the subject of a criminal indictment during the five years preceding the submission of this bid? If yes, list the name of the individual convicted or indicted, the charge against the individual and the date of disposition of the charge. _____
14. During the five-year period preceding the bidder's submission of this bid, has the bidder been charged with and/or found guilty of any violations of federal, state, or municipal environment and/or health laws, codes, rules and/or regulations? If yes, list the nature of the charge against the bidder, the date of the charge, and the status of the charge at the time of the submission of this bid. _____
15. Has the bidder bid on any projects within two years of this bid's due date? If yes, list the projects bid on, whether said bid was awarded to the bidder and the expected date of commencement of the work for said project. For those projects listed, if the bidder was not awarded the contract, state whether the bidder was the lowest monetary bidder.

16. Have you ever failed to complete any work awarded to you? If yes, list where and the reasons therefore.

17. Have you ever defaulted on a contract? If yes, list the contract and the reasons therefore.

18. List your experience in work similar to this project.

19. Specify the equipment you plan to use for this project. List whether said equipment is the property of the bidder or possessed by lease_____

SIGNATURE _____

TITLE _____

Sworn to before me this

_____day of _____, 20____

Notary Public

NON-DISCRIMINATION STATEMENT

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, national origin, sexual orientation, age, disability, genetic predisposition or carrier status, military status, domestic violence victim status, or marital 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 subcontractor 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. Contract 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 for a second or any subsequent violation.

BY: _____
Signature

Print Name and Title of Signatory

DATE: _____

SEXUAL HARASSMENT POLICY STATEMENT

The below signed bidder affirms the following as true under the penalties of perjury:

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that the bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meet the requirements of section two hundred one-g of the labor law.

If the bidder cannot make the foregoing certification, such bidder shall state so and shall furnish with the bid a signed statement which sets forth in detail the reasons therefor.

BY: _____
Signature

Print Name and Title of Signatory

DATE: _____

Sworn to before me this

_____ day of _____, 20____

Notary Public

INSTRUCTION SHEET AIA DOCUMENT A312a

FOR AIA DOCUMENT A312, PERFORMANCE BOND AND PAYMENT BOND

A. GENERAL INFORMATION

1. Purpose

AIA Document A312 is a new document which combines two separate bonds into one form. This is not a single combined Performance and Payment Bond. It is customary to issue these two bonds simultaneously and to pay one premium for both. The separate procurement of one bond without the other will normally not reduce the premium.

The Performance Bond is an assurance by the Contractor and the Contractor's Surety that the work will be performed and completed in accordance with the terms of the Construction Contract. The Payment Bond is an assurance by the Contractor and the Contractor's Surety that labor and materials bills incurred in connection with the Construction Contract will be paid. This assurance is limited by the amount of each bond.

Normally, these bond forms are prepared for execution by the Surety or the Surety's agent.

2. Related Documents

The 1970 edition of the Performance Bond and Labor and Material Payment Bond, AIA Document A311, will continue to be published because it complies with the federal Miller Act and various state laws, frequently called Little Miller Acts. These bonds are a required substitute under the Miller Act for mechanics lien laws which do not apply to governmental works. Caution should be exercised to assure compliance with current laws and regulations.

Other related documents are:

A201, General Conditions of the Contract for Construction
A201/CM, General Conditions of the Contract for Construction, Construction Management Edition
A201/SC, General and Federal Supplementary Conditions of the Contract for Construction
A271, General Conditions of the Contract for Furniture, Furnishings and Equipment
A501, Recommended Guide for Competitive Bidding Procedures and Contract Awards for Building Construction
A511, Guide for Supplementary Conditions
A511/CM, Guide for Supplementary Conditions, Construction Management Edition
A571, Guide for Interiors Supplementary Conditions
A701, Instructions to Bidders
A771, Instructions to Interiors Bidders

For further reference, see *Construction Bonds and Insurance Guide*, 2nd edition, by Bernard B. Rothschild, FAIA; published by the AIA.

3. Use of Non-AIA Forms

Unlike most AIA documents, the A312 and A311 Documents are not especially interlinked by reference to the other AIA documents. They are general forms which may be used with any appropriate non-AIA document.

4. Use of Current Documents

Prior to using any AIA document, the user should consult the AIA or an AIA component chapter to determine the current edition of each document.

5. Credits

AIA Document A312 was prepared as a service to the construction and surety industries through the joint efforts of The Surety Association of America, The Engineers Joint Contract Documents Committee, The Associated General Contractors of America and The American Institute of Architects.

B. COMPLETING THE A312 FORM

1. Modifications

Users are encouraged to consult with their professional advisor (attorney or bond specialist) with respect to completing or modifying the form. Legal counsel should also be sought concerning the effect of federal, state and local laws on the terms of this Document.

Generally, modifications to the Performance Bond and Payment Bond may be made by filling in the box on the title page of each bond and stating any deletion or addition on the last page of each bond or on an additional page.

2. General

These instructions apply equally to the Performance Bond and to the Payment Bond. Both bonds require identical information on them, but each bond must be executed separately. Even though the A312 Document contains both bonds, they are still very separate bonds. The completion of one bond (e.g., the Performance Bond) is not sufficient to bind the parties to the other (e.g., the Payment Bond). Users should be careful not to mix one bond with the other. A common mistake is to fill in the cover page of the Performance Bond and to sign the signature page of the Payment Bond. In such a case, it is likely that neither bond will become binding.

3. Title Page of Each Bond (Pages 1 and 4)

Identification of Parties: The Contractor and Surety should be identified along with the Owner, the Owner's Representative and the Agent or Broker. It is especially important that the Contractor and Surety be identified by using their full legal names and addresses, including the legal status of the parties: sole proprietorship, general partnership, joint venture, unincorporated association, limited partnership, corporation (general or professional), etc. The identification of the Owner's Representative and the Agent or Broker is for information only, since they are not parties to the bond agreement.

Description of the Construction Contract: The Construction Contract should be described by date and amount and by the official name and location of the Project as used in the Construction Contract. The amount of the Construction Contract should be in both written and numerical form.

Bond Amount: The dollar amount of the bond should be in both written and numerical form. Frequently, each bond (the Performance Bond and Payment Bond) will be written to equal individually 100 percent of the Construction Contract Amount.

Bond Date: This date should not be earlier than the date of the Construction Contract which is adopted by reference.

C. EXECUTION OF THE BONDS

Each bond must be separately signed by the Contractor and the Surety on the title page of each bond (pages 1 and 4). Additional space is provided on the last page of each bond (pages 3 and 6) for the signatures of additional parties. The parties executing (signing) the bond should indicate their company, print their name and title, and impress the corporate seal, if any. Where appropriate, attach a copy of the resolution or bylaw authorizing the individual to act on behalf of the firm or entity. Evidence of authority to sign on behalf of each party should be obtained. As to the Surety, this usually takes the form of a power of attorney issued by the surety company to the agent who signs on its behalf.

SAMPLE

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A312

Performance Bond

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

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

OWNER (Name and Address):

CONSTRUCTION CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Construction Contract Date):

Amount:

Modifications to this Bond:

☐ None

☐ See Page 3

CONTRACTOR AS PRINCIPAL
Company:

(Corporate Seal)

SURETY
Company:

(Corporate Seal)

Signature: _____
Name and Title:

Signature: _____
Name and Title:

(Any additional signatures appear on page 3)

(FOR INFORMATION ONLY—Name, Address and Telephone)
AGENT or BROKER:

OWNER'S REPRESENTATIVE (Architect, Engineer or
other party):

1 The Contractor and the 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 to participate in conferences as provided in Subparagraph 3.1.

3 If there is no Owner Default, the Surety's obligation under this Bond shall arise after:

3.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and

3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and

3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.

4 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:

4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or

4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or

4.3 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 the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

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, tender payment therefor to the Owner; or

2 Deny liability in whole or in part and notify the Owner citing reasons therefor.

5 If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen 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 Subparagraph 4.4, and the Owner refuses the payment tendered 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.

6 After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:

6.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

6.2 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 4; and

6.3 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.

7 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators or successors.

8 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.

9 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation avail-

able to sureties as a defense in the jurisdiction of the suit shall be applicable.

10 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.

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

12 DEFINITIONS

12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Con-

tractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

12.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.

12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL
Company:

(Corporate Seal)

SURETY
Company:

(Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

Signature: _____
Name and Title: _____
Address: _____

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A312

Payment Bond

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

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

OWNER (Name and Address):

CONSTRUCTION CONTRACT

Date:

Amount:

Description (Name and Location):

BOND

Date (Not earlier than Construction Contract Date):

Amount:

Modifications to this Bond:

☐ None

☐ See Page 6

CONTRACTOR AS PRINCIPAL

Company:

(Corporate Seal)

SURETY

Company:

(Corporate Seal)

Signature: _____

Name and Title:

Signature: _____

Name and Title:

(Any additional signatures appear on page 6)

(FOR INFORMATION ONLY—Name, Address and Telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE (Architect, Engineer or other party):

1 The Contractor and the 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.

2 With respect to the Owner, this obligation shall be null and void if the Contractor:

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2 Defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity whose claim, demand, lien or suit is for the payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.

3 With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.

4 The Surety shall have no obligation to Claimants under this Bond until:

4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with the Contractor:

.1 Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

.2 Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and

.3 Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor

5 If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.

6 When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2 Pay or arrange for payment of any undisputed amounts.

7 The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

9 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 payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

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 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this

Bond shall be construed as a statutory bond and not as a common law bond.

14 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15 DEFINITIONS

15.1 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 Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the

Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL
Company:

(Corporate Seal)

SURETY

Company:

(Corporate Seal)

Signature: _____
Name and Title: _____
Address: _____

Signature: _____
Name and Title: _____
Address: _____

DRAFT AIA® Document A101™ – 2017

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

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

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

« [Greenburgh Central School District](#) »« »
« [475 W. Hartsdale Avenue](#)
[Hartsdale, New York 10530](#) »
« »
« »

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

« »« » »
« »
« »
« »

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

« »
« »
« »

The Architect:
(Name, legal status, address and other information)

« [BBS Architects, Landscape Architects and Engineers PC](#) »« »
« [244 E. Main Street](#) »
« [Patchogue, New York 11772](#) »
« »

The Owner and Contractor agree as follows.

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

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

The parties should complete A101™-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4	CONTRACT SUM
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EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents or reasonably inferable by the Contractor as necessary to produce the results intended by the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others. If a schedule of Work is annexed hereto it is hereby integrated herein by reference. Completion of the Work must be in accordance with the Schedule of Work, as applicable.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- ☐ The date of this Agreement.
- ☐ A date set forth in a notice to proceed issued by the Owner.
- ☐ Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

Commented [u1]: Article III shall be completed by the Architect based on the specifics of the Project.

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » (\$ « »), subject to additions and deductions as provided in the Contract Documents.

Commented [u2]: Article 4 shall be completed by the Architect based on the specifics of the Project..

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

Commented [u3]: To be completed by the Architect based on the specifics of the Project.

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The Contractor shall submit a "pencil copy" of the Application for Payment to the Architect for review and approval no later than five (5) calendar days prior to a required submission date. The Architect shall accept, reject or order the pencil copy modified within five (5) business days of receipt and only then may it be submitted to the Architect and Owner as indicated above.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.6.3 All progress payments made previous to the last and final payment shall be based on estimates and the right is hereby reserved by the Architect for the Owner to make all due and proper corrections in any payment for any previous error.

§ 5.1.6.4 The Contractor shall submit with each application for payment the following:

- .1 A current sworn statement from the Contractor setting forth all Subcontractors, including material men with whom the Contractor has subcontracted, the amount of such subcontract, the amount requested for any Subcontractor including any material men in the application for payment and the amount to be paid to the Contractor from such progress payment;
- .2 Commencing with the second (2nd) Application for Payment submitted by the Contractor, duly executed so-called "after the fact" waivers of mechanics' and material men's liens from all Subcontractors, including material men and, when appropriate Subcontractors, establishing receipt of payment or satisfaction of payment of all amounts requested on behalf of such entities and disbursed prior to submittal by the Contractor of the current Application for Payment, plus sworn statements from all Subcontractors, including material men and, where appropriate, from Sub-subcontractors, covering all amounts described in this Paragraph; and
- .3 Such other information, documentation and materials as the Owner or the Architect may require.

§ 5.1.6.5 Payment shall not be released to the Contractor until the Owner receives the following documentation:

- .1 Certified payroll for employees and employees of Subcontractors performing work on the Project.
- .2 Copies of invoices submitted to the Contractor by its Subcontractors including material suppliers.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« »

Commented [u4]: To be completed by the Architect. Districts often use 5%.

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

«Upon Substantial Completion, as certified in writing by the Architect and accepted by the Owner, the Contractor shall be paid one-half of the retainage less any amounts withheld due to claims, insurance premiums owed by the Contractor or liens or work to be completed or corrected. One-half of the remainder of the retainage shall be paid to the Contractor thirty (30) days after final completion, as certified by the Architect and agreed to by the Owner. The remaining retainage shall be paid to the Contractor upon receipt by the Owner of all of the certifications required by the applicable governmental agencies. »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201-2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« See § 5.1.7.2 »

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located. (Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201-2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker. (If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
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« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201-2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[☐] Arbitration pursuant to Section 15.4 of AIA Document A201-2017

[☒] Litigation in a court of competent jurisdiction

[☐] Other (Specify)

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201-2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.1.2 Where reference is made in this Agreement to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.1.3 The Contractor represents and warrants the following to the Owner (in addition to any other representations and warranties contained in the Contract Documents) as an inducement to the Owner to execute this Agreement, which representations and warranties shall survive the execution and delivery of this Agreement, any termination of this Agreement and the final completion of the Work:

1. that it and its Subcontractors are financially solvent, able to pay all debts as they mature and possess sufficient working capital to complete the Work and perform all obligations hereunder;
2. that it is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform its obligations hereunder;
3. that it is authorized to do business in the State of New York and the United States and properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over it and over the Work and the Project;
4. that its execution of this Agreement and its performance thereof is within its duly authorized powers;
5. that its duly authorized representative has visited the site of the Project, is familiar with the local and special conditions under which the Work is to be performed and has correlated on-site observations with the requirements of the Contract Documents; and
6. that it possesses a high level of experience and expertise in the business administration, construction, construction management and superintendence of projects of the size, complexity and nature of this Project, and that it will perform the Work with the care, skill and diligence of a contractor with such experience.

§ 8.1.4 The foregoing warranties are in addition to, and not in lieu of, any and all other liability imposed upon the Contractor by law with respect to the Contractor's duties, obligations and performance hereunder. The Contractor's liability hereunder shall survive the Owner's final acceptance of and payment for the Work. All representations and warranties set forth in the Contract, including without limitation the representations and warranties set forth in this Article, shall survive the final completion of the Work or the earlier termination of this Contract. The Contractor acknowledges that the Owner is relying upon the Contractor's skill and experience in connection with the Work called for hereunder.

§ 8.1.5 The Contractor shall provide a set of reproducible record drawings showing significant changes in the Work made during construction based on marked-up prints. Drawings and other data including, but not limited to the location of water, sewer, telephone, electric, gas and any other utility lines as they relate to the Owner. In addition, the Contractor shall: (i) certify these Drawings are accurate; and (ii) include in its schedule of value allocation the production of reproducible record drawings. In the event the Contractor is unable to provide such Drawings and the Architect is required to provide such service to the Owner, the Contractor shall be responsible for paying the Architect directly for such costs.

§ 8.1.6 The Contractor shall provide operation manuals and adequate training to the Owner with respect to the operation of mechanical, electrical, heating and air conditioning systems installed by the Contractor.

§ 8.1.7 In the event the Architect is required to perform any Construction Phase Services 60 days after the date of Substantial Completion, the Contractor shall be responsible for paying the Architect directly for such costs.

§ 8.1.8 In the event the Architect is required to exceed any of the limits set forth below while performing Construction Phase Services, the Contractor shall be responsible for paying the Architect directly for such costs:

- .1 Two (2) reviews of each Shop Drawing, Project Data item, sample and similar submittals of the Contractor.
- .2 Two (2) visits to the site by the Architect over the duration of the Project during construction.
- .3 Two (2) inspections for any portion of the Work to determine whether such portion of the Work is substantially complete in accordance with the requirements of these General Conditions.
- .4 Two (2) inspections for any portion of the Work to determine final completion.

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§ 8.1.9 The Contractor shall specify, supervise and assure that the Owner obtains any available rebates relates to the Project and its fixtures, furniture and equipment for the Projects, including but not limited to utility rebates.

§ 8.1.10 The Contractor(s) or anyone retained or employed Contractor, shall indemnify the Owner, the Architect, and its consultants and hold them harmless from all claims that may arise out of or result from the Contractor's or other person or entity's work, services or operations to the maximum extent permitted by law.

§ 8.1.11 The Parties agree to comply with all Federal, State, District and local law, rules, regulations, Executive Orders, ordinances, policies, procedures, rules and standards which shall include but not be limited to any legislative action taken at the Federal, State or local level or any other mandate issued by an authority with appropriate jurisdiction. In addition, the Contractor shall perform all Work required for the Project in conformance with any guidance issued by the Center for Disease Control and Prevention, the New York State Department of Health, the Westchester County Department of Health or any other party with appropriate jurisdiction, which shall include but not be limited to the cleaning and disinfecting of surfaces, the use of face masks or coverings, the use of proper personal protection equipment and social distancing protocols.

§ 8.2 The Owner's representative:

(Name, address, email address, and other information)

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<< Decisions to be made or consents to be given solely by the Architect pursuant to this Agreement shall be made or given with the consent and agreement of the Owner. >>

Commented [u5]: To be completed by the Architect.

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

<< >>
<< >>
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<< >>
<< >>

<< >>

Commented [u6]: To be completed by the Architect.

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

<< >>

§ 8.7 Other provisions:

<< >>

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 ~~AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:~~

(Insert the date of the E203-2013 incorporated into this Agreement.)

<< >>

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

Commented [u7]: To be completed by the Architect.

.8 Other Exhibits:

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

[« »] AIA Document E204™ 2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204 2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

- .9 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

Greenburgh Central School District

OWNER (Signature)

« »« »

(Printed name and title)

CONTRACTOR (Signature)

« »« »

(Printed name and title)

Commented [u8]: Please ensure that all documents which should be included within the Contract Documents, and only those documents, are explicitly listed here (for example, Prevailing Wage Requirements, Bid Collusion Affidavits, Sexual Harassment Training Certification, etc).

DRAFT AIA® Document A101™ – 2017

Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

« »
« »

THE OWNER:
(Name, legal status and address)

« Greenburgh Central School District » « »
« 475 W. Hartsdale Avenue »
« Hartsdale, New York 10530 »

THE CONTRACTOR:
(Name, legal status and address)

« » « »
« »

TABLE OF ARTICLES

- A.1 GENERAL
- A.2 OWNER'S INSURANCE
- A.3 CONTRACTOR'S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

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

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

This document is intended to be used in conjunction with AIA Document A201™–2017, General Conditions of the Contract for Construction. Article 11 of A201™–2017 contains additional insurance provisions.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ A.2.3 Required Property Insurance

§ A.2.5 Other Optional Insurance.

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 **Certificates of Insurance.** The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 **Deductibles and Self-Insured Retentions.** The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 **Additional Insured Obligations.** To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, its Board of Education members, attorneys, officers, employees, representatives and agents, Architect, Architect's consultants, and agents and employees of any of them the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner, its Board of Education members, attorneys, officers, employees, representatives and agents, Architect, Architect's consultants, and agents and employees of any of them the Owner as ~~an~~ additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Trade Contractor, Subcontractor, Sub-Subcontractor, Supplier or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:
ENTER APPLICABLE INSURANCE REQUIREMENTS

Commented [u1]:

All insurance provided for in this Article, unless specifically provided otherwise, shall be provided by the Contractor, Subcontractor, Sub-Subcontractor or Supplier at no additional cost to the Owner beyond any cost for insurance provided for in the Guaranteed Maximum Price.

§ A.3.2.2 Certificates of insurance together with the full insurance policies, including but not limited to the policy declaration pages, lists of Forms and Endorsements, the Forms and Endorsements themselves and the base insurance policies for all insurance coverage required in this Article, acceptable to the Owner, shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies providing the coverage required by this Article shall contain a provision that coverage afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for Completed Operations, shall be submitted with the final Application for Payment as required by the Contract Documents and thereafter upon renewal or replacement of such coverage until the expiration of the time required by the Contract Documents. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ A.3.2.3 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, its Board of Education members, attorneys, officers, employees, representatives and agents, Architect, Architect's consultants, and agents and employees of any of them, as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner, its Board of Education members, attorneys, officers, employees, representatives and agents, Architect, Architect's consultants, and agents and employees of any of them as additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2.2 of the General Conditions, unless a different duration is stated below:

Commented [u2]: Please note that this provision may be removed if the Architect determines that it would detract potential bidders.

§ A.3.4 Performance Bond and Payment Bond

§ A.3.4.1 The Contractor, within five days of signing this Agreement, but, in any event, prior to commencing the Work, shall, at its own cost, obtain and deliver to Owner or Architect a Payment and Performance Bond (together, the "Bonds") in an amount equal to one hundred percent (100%) of the Contract Sum, in favor of the Owner and maintain same at that amount and percentage throughout the course of the Work.

§ A.3.4.2 Prior to the execution of the Contract, the successful bidder shall furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder.

§ A.3.4.3 Each Bond shall be in a form satisfactory to the Owner and the Architect and shall be underwritten by a surety company authorized to do business in the State of New York with an AM Best rating of "A" or better.

§ A.3.4.4 AIA Document A312-2010, Performance Bond and Payment Bond shall be the form of the Bonds for this Project.

§ A.3.4.5 The Bonds shall extend and remain in effect one (1) year after Substantial Completion of the Project. However, the period of time required for the Contractor to perform warranty and repair Work shall be two (2) years after Substantial Completion.

§ A.3.4.6 The Bonds shall include a rider with the following provisions/modifications:

.1 Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change, extension of time or other modification of the Contract Documents. Any addition, alteration, omission, change, extension of time or other modification of the Contract Documents, or a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety from its obligations hereunder and notice to the Surety of such matters is hereby waived.

.2 Surety further agrees that, in the event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Subcontractor/trade contractor/material supplier or Surety shall cause written notice of such default (specifying said default in detail) to be given to the Owner and the Owner shall have thirty (30) days from the date of the receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of such default is such that it cannot be cured within thirty (30) days. Notice of Default shall be sent to the Owner by certified or registered U.S. Mail, return receipt requested, postage prepaid.

.3 Any provision or condition in the Bonds to the contrary notwithstanding, the time period for the Owner to commence any action or proceeding, legal or equitable, under the Bonds, in a court of competent jurisdiction in the jurisdiction in which the Project is located, shall be no less than the time period provided for in the New York Civil Practice Law and Rules (or any subsequently enacted civil practice act or applicable statute) for the commencement of an action upon a contractual obligation or liability. The time within which an action or proceeding must be commenced shall be computed from the later of:

- i. the last date of Work of the Contractor/Subcontractor/trade contractor/material supplier, Surety or any completion or replacement contractor; or
- ii. the date on which the Contractor/Subcontractor/trade contractor/material supplier, Surety or any completion or replacement thereof is declared in default; or
- iii. the date on which the Owner receives specific written notice that the Surety refuses or fails to perform any of its obligations or denies any claim made by the Owner, pursuant to the Bonds.

In addition, any period of limitations for the commencement of any action or proceeding shall be tolled and suspended during any negotiations or discussions by, between and among the Owner, Contractor/Subcontractor/trade contractor/material supplier and/or Surety in relation to resolving any dispute between the Owner, Contractor/Subcontractor/trade contractor/material supplier and/or Surety; or while any Work is being performed on the Project by the Contractor, Surety or any completion or replacement contractor. The period of limitations shall, thereafter, commence running anew when the Owner receives (or provides) specific written notice that the Surety refuses or fails to perform any of its obligations or denies any claim made by the Owner, pursuant to the Bonds.

.4 The Surety and Contractor shall be liable for any costs and expenses incurred by the Owner in relation to the default of the Contractor or any Subcontractor/trade contractor/material supplier and/or in prosecuting a claim against, or defending a claim by, either the Contractor or the Surety including, but not limited to, reasonable attorneys, engineering and consultants fees and disbursements.

.5 Surety agrees that it is obligated under the Bonds to any successor, grantee or assignee of the Owner.

.6 The Surety shall promptly provide the Owner with a copy of any notice it receives from a claimant.

.7 All provisions of the laws of the State of New York applicable to public improvement projects, claims against subdivisions of the State of New York and Bonds shall apply to the Project, the Contract and the Bonds. The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

« § A.3.4.6 Maintenance Bond

Before the Final Payment is made, the Contractor shall provide the Owner with a Maintenance Bond in the amount of ten percent (10%) of the contract sum, to insure the replacement or repair of defective materials or workmanship for a period of one year from the date of Substantial Completion. »



SAMPLE INSURANCE REQUIREMENTS – CONTRACTORS

1. Notwithstanding any terms, conditions or provisions, in any other writing between the parties, the contractor hereby agrees to effectuate the naming of the District/BOCES as an Additional Insured on the contractor's insurance policies, except for workers' compensation and N.Y. State Disability insurance.
2. The policy naming the District as an Additional Insured shall:
 - a. Be an insurance policy from an A.M. Best A- rated or better insurer, licensed to conduct business in New York State. A New York licensed and admitted insurer is strongly preferred. The decision to accept non-licensed and non-admitted carriers lies exclusively with the District/BOCES and may create significant vulnerability and costs for the District/BOCES.
 - b. State that the organization's coverage shall be primary and non-contributory coverage for the District/BOCES, its Board, employees and volunteers.
 - c. Additional insured status shall be provided by standard or other endorsements that extend coverage to the District/BOCES for on-going operations (CG 20 38) and products and completed operations (CG 20 37). The decision to accept an endorsement rest solely with the District/BOCES. A completed copy of the endorsements must be attached to the Certificate of Insurance.
3.
 - a. The certificate of insurance must describe the services provided by the contractor (e.g., roofing, carpentry or plumbing) that are covered by the liability policies.
 - b. At the District's/BOCES' request, the contractor shall provide a copy of the declaration page of the liability and umbrella/excess policies with a list of endorsements and forms. If requested, the contractor will provide a copy of the policy endorsements and forms.
 - c. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/15) must be included with the certificates of insurance. For any "Yes" answers on Items G through L on this Form– additional details must be provided in writing.
4. The contractor agrees to indemnify the District/BOCES for applicable deductibles and self-insured retentions.



5. Minimum Required Insurance:

a. **Commercial General Liability Insurance**

\$1,000,000 per Occurrence/ \$2,000,000 Aggregate

\$2,000,000 Products and Completed Operations

\$1,000,000 Personal and Advertising Injury

\$100,000 Fire Damage

\$10,000 Medical Expense

The general aggregate shall apply on a per-project basis.

b. **Owners Contractors Protective (OCP) Insurance**

For projects less than or equal to \$1,000,000 and work on 1 story (10 feet) only;

\$1 million per occurrence, \$2 million aggregate with the District/BOCES as the Named Insured.

For projects greater than \$1,000,000 and work over 1 story (10 feet); \$2 million per occurrence, \$4 million aggregate with the District/BOCES as the Named Insured.

For all projects where General Liability, Auto and Umbrella/Excess Coverage is with non-licensed and non-admitted carriers in New York State; \$2 million per occurrence, \$4 million aggregate with the District/BOCES as the named Insured.

The District/BOCES will be the Named Insured on OCP Policies. There will be no Additional Insureds on any OCP Policies.

c. **Automobile Liability**

\$1,000,000 combined single limit for owned, hired, borrowed and non-owned motor vehicles.

d. **Workers' Compensation and NYS Disability Insurance**

Statutory Workers' Compensation (C-105.2 or U-26.3); and NYS Disability Insurance (DB-120.1) for all employees. Proof of coverage must be on the approved specific form, as required by the New York State Workers' Compensation Board. ACORD certificates are not acceptable. A person seeking an exemption must file a CE-200 Form with the state. The form can be completed and submitted directly to the WC Board online.



e. **Builder's Risk**

Must be purchased by the contractor to include interest of the Owner and Contractor jointly in a form satisfactory to the owner. The limit must reflect the total completed value – all material and labor costs and provide coverage for fire, lightning, explosion, extended coverage, vandalism, malicious mischief, windstorm, hail and/or flood.

f. **Umbrella/Excess Insurance**

\$5 million each Occurrence and Aggregate for general construction and no work at elevation (1 story – 10 feet) or project values less than or equal to \$1,000,000.

\$10 million each Occurrence and Aggregate for high risk construction, work at elevation (>1 story or 10 feet) or project values greater than \$1,000,000.

Umbrella/Excess coverage shall be on a follow-form basis.

6. Contractor acknowledges that failure to obtain such insurance on behalf of the District/BOCES constitutes a material breach of contract and subjects it to liability for damages, indemnification and all other legal remedies available to the District/BOCES. The contractor is to provide the District/BOCES with a certificate of insurance, evidencing the above requirements have been met, prior to the commencement of work.
7. Sub-contractors are subject to the same terms and conditions as stated above and submit same to the District/BOCES for approval prior to start of any work.
8. In the event the Contractor fails to obtain the required certificates of insurance from the Subcontractor and a claim is made or suffered, the Contractor shall indemnify, defend, and hold harmless the District/BOCES, its Board, employees and volunteers from any and all claims for which the required insurance would have provided coverage. **This indemnity obligation is in addition to any other indemnity obligation provided in the Contract.**



ADDITIONAL REQUIREMENTS ASBESTOS, LEAD ABATEMENT AND/OR HAZARDOUS MATERIALS

Asbestos/Lead Abatement Insurance

\$2,000,000 per occurrence/\$2,000,000 aggregate, including products and completed operations. Such insurance shall include coverage for the Contractor's operations including, but not limited to, removal, replacement, enclosure, encapsulation and/or disposal of asbestos, or any other hazardous material, along with any related pollution events, including coverage for third-party liability claims for bodily injury, property damage and clean-up costs. If a retroactive date is used, it shall pre-date the inception of the Contract.

If the Contractor is using motor vehicles for transporting hazardous materials, the Contractor shall maintain pollution liability broadened coverage (ISO endorsement CA 9948), as well as proof of MCS 90. Coverage shall fulfill all requirements of these specifications and shall extend for a period of three (3) years following acceptance by the District/BOCES of the Certificate of Completion.

Testing Company Errors and Omission Insurance

\$1,000,000 per occurrence/\$2,000,000 aggregate for the testing and other professional acts of the Contractor performed under the Contract with the District/BOCES.

Application and Certificate for Payment, Construction Manager as Adviser Edition

TO OWNER:	PROJECT: <u>Templete</u>	APPLICATION NO:	DISTRIBUTION TO:
FROM	VIA CONSTRUCTION	PERIOD TO:	OWNER
CONTRACTOR:	MANAGER:	CONTRACT DATE:	CONSTRUCTION MANAGER
CONTRACT FOR: <u>General Construction</u>	VIA ARCHITECT:	PROJECT NOS: <u>/ /</u>	ARCHITECT
			CONTRACTOR
			FIELD
			OTHER

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
AIA Document G703[™], Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM	\$		
2. NET CHANGES IN THE WORK	\$	0.00	
3. CONTRACT SUM TO DATE (Line 1 ± 2)	\$	0.00	
4. TOTAL COMPLETED AND STORED TO DATE (Column G on G703) ...	\$		
5. RETAINAGE:			
a. <u>0</u> % of Completed Work (Column D + E on G703)	\$	0.00	
b. <u>0</u> % of Stored Material (Column F on G703)	\$	0.00	
Total Retainage (Lines 5a + 5b, or Total in Column I on G703).....			
6. TOTAL EARNED LESS RETAINAGE	\$	0.00	
(Line 4 minus Line 5 Total)			
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT	\$		
(Line 6 from prior Certificate)			
8. CURRENT PAYMENT DUE	\$	0.00	
9. BALANCE TO FINISH, INCLUDING RETAINAGE			
(Line 3 minus Line 6)			
	\$	0.00	

SUMMARY OF CHANGES IN THE WORK	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$	\$
Total approved this month including Construction Change Directives	\$	\$
	TOTALS \$	0.00 \$
NET CHANGES IN THE WORK	\$	0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of: _____

County of: _____

Subscribed and sworn to before
me this _____ day of _____

Notary Public: _____

My Commission expires: _____

CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on evaluations of the Work and the data comprising this application, the Construction Manager and Architect certify to the Owner that to the best of their knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

CONSTRUCTION MANAGER:

By: _____ Date: _____

ARCHITECT: (NOTE: If Multiple Prime Contractors are responsible for performing portions of the Project, the Architect's Certification is not required.)

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.



AIA Document, G702TM–1992, Application and Certification for Payment, or G736TM–2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

ARCHITECT'S PROJECT NO:

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User Notes: (1915840843)



AIA[®] Document G715[™] – 1991

Supplemental Attachment for ACORD Certificate of Insurance 25-S

PROJECT (Name and address): _____

INSURED _____

A. General Liability

- | | Yes | No | N/A |
|--|--------------------------|--------------------------|--------------------------|
| 1. Does the General Aggregate apply to this Project only? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Does this policy include coverage for: | | | |
| a. Premises - Operations? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Explosion, Collapse and Underground Hazards? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Personal Injury Coverage? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Products Coverage? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Completed Operations? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Contractual Coverage for the Insured's obligations in A201? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. If coverage is written on a claims-made basis, what is the: | | | |
| a. Retroactive Date? | | | |
| b. Extended Reporting Date? | | | |

B. Worker's Compensation

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| 1. If the Insured is exempt from Worker's Compensation statutes, does the Insured carry the equivalent Voluntary Compensation coverage? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|---|--------------------------|--------------------------|--------------------------|

C. Final Payment Information

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| 1. Is this certificate being furnished in connection with the Contractor's request for final payment in accordance with the requirements of Sections 9.10.2 and 11.1.3 of AIA Document A201, General Conditions of the Contract for Construction? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. If so, and if the policy period extends beyond termination of the Contract for Construction, is Completed Operations coverage for this Project continued for the balance of the policy period? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

D. Termination Provisions

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| 1. Has each policy shown on the certificate and this Supplement been endorsed to provide the holder with 30 days notice of cancellation and/or expiration? List below any policies which do not contain this notice. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|

E. Other Provisions

Authorized Representative

Date of Issue



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:		
	PHONE (A/C, No. Ext):	FAX (A/C, No):	
INSURED	E-MAIL ADDRESS:		
	INSURER(S) AFFORDING COVERAGE		NAIC #
	INSURER A :		
	INSURER B :		
	INSURER C :		
	INSURER D :		
INSURER E :			
INSURER F :			

COVERAGES**CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY						EACH OCCURRENCE	\$
	<input type="checkbox"/> COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	\$
	<input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR						MED EXP (Any one person)	\$
							PERSONAL & ADV INJURY	\$
							GENERAL AGGREGATE	\$
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	\$
	<input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC							\$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	\$
	<input type="checkbox"/> ANY AUTO						BODILY INJURY (Per person)	\$
	<input type="checkbox"/> ALL OWNED AUTOS						BODILY INJURY (Per accident)	\$
	<input type="checkbox"/> HIRED AUTOS						PROPERTY DAMAGE (Per accident)	\$
								\$
	UMBRELLA LIAB						EACH OCCURRENCE	\$
	<input type="checkbox"/> EXCESS LIAB						AGGREGATE	\$
	<input type="checkbox"/> DED <input type="checkbox"/> RETENTION \$							\$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						<input type="checkbox"/> WC STATUTORY LIMITS <input type="checkbox"/> OTHER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICE/MEMBER EXCLUDED? (Mandatory in NH)	<input type="checkbox"/> Y / <input type="checkbox"/> N	<input type="checkbox"/> N / <input type="checkbox"/> A				E.L. EACH ACCIDENT	\$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	\$
							E.L. DISEASE - POLICY LIMIT	\$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER**CANCELLATION**

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

BBS ARCHITECTS LANDSCAPE ARCHITECTS ENGINEERS

FREDERICK W. SEEBA, PE, MANAGING PARTNER
LAWRENCE SALVESEN, AIA, PARTNER
KEVIN J. WALSH, AIA, PARTNER
KENNETH G. SCHUPNER, AIA, PARTNER
JOSEPH B. RETTIG, AIA, PARTNER
GARY W. SCHIEDE, AIA, PARTNER
ROGER P. SMITH, AIA, FOUNDING PRINCIPAL

Date: _____

Owner: _____

Project: _____

Contractor: _____

Dear Sir/Madam:

Reference is made to your contract with _____ for the above referenced Project. By signing below, you hereby acknowledge and agree, that for valuable consideration, the receipt of which is acknowledged, you covenant and agree that BBS Architects, Landscape Architects & Engineers PC, shall be added as an "additional insured" to your casualty and commercial liability insurance policies required under the Contract, including all primary and excess policies, limits, and terms and conditions contained therein, and further agree that an insurance certificate and endorsement confirming that this entity was added as an "additional insured" on such policies of insurance shall be provided by you prior to the commencement of work on the Project.

In addition, you further covenant and agree to hold harmless, indemnify and defend BBS Architects, Landscape Architects, and Engineers, PC to the same extent that you are required to hold harmless, indemnify and defend the Owner under the Contract, however, Contractor is not responsible for defense and indemnity for claims, demands or suits caused solely by Architect's professional negligence.

Acknowledged and agreed to by:

Name

Signature

Contractor

Rev. 12-31-18

CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS

AIA Document G706

OWNER
ARCHITECT
CONTRACTOR
SURETY
OTHER

☐
☐
☐
☐
☐

TO (Owner)

☐

ARCHITECT'S PROJECT NO:

☐

CONTRACT FOR:

☐

☐

CONTRACT DATE:

PROJECT:

(name, address)

State of:

County of:

The undersigned, pursuant to Article 9 of the General Conditions of the Contract for Construction, AIA Document A201, hereby certifies that, except as listed below, he has paid in full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or his property might in any way be held responsible.

EXCEPTIONS: (If none, write "None". If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each exception.)

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA DOCUMENT G707, CONSENT OF SURETY, may be used for this purpose.
Indicate attachment: (yes) (no).

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens (AIA DOCUMENT G706A).

CONTRACTOR:

Address:

BY:

Subscribed and sworn to before me this
day of

19

Notary Public:

My Commission Expires:

**CONTRACTOR'S
AFFIDAVIT OF
RELEASE OF LIENS**

AIA DOCUMENT G706A

OWNER ☐
ARCHITECT ☐
CONTRACTOR ☐
SURETY ☐
OTHER ☐

TO (Owner) ☐

ARCHITECT'S PROJECT NO:

☐ CONTRACT FOR:

PROJECT: ☐

(name, address)

☐ CONTRACT DATE:

State of:

County of:

The undersigned, pursuant to Article 9 of the General Conditions of the Contract for Construction, AIA Document A201, hereby certifies that to the best of his knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS: (If none, write "None". If required by the Owner, the Contractor shall furnish bond satisfactory to the Owner for each exception.)

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR:

Address:

BY:

Subscribed and sworn to before me this
day of

19

Notary Public:

My Commission Expires:

**CONSENT OF
SURETY COMPANY
TO FINAL PAYMENT**

AIA DOCUMENT G707

OWNER
ARCHITECT
CONTRACTOR
SURETY
OTHER

☐
☐
☐
☐
☐

PROJECT:
(name, address)

TO (Owner)

☐

☐ ARCHITECT'S PROJECT NO:
CONTRACT FOR:

☐

☐ CONTRACT DATE:

CONTRACTOR:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(here insert name and address of Surety Company)

, SURETY COMPANY,

on bond of (here insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not
relieve the Surety Company of any of its obligations to (here insert name and address of Owner)

, OWNER,

as set forth in the said Surety Company's bond.

IN WITNESS WHEREOF,
the Surety Company has hereunto set its hand this

day of

19

Surety Company

Signature of Authorized Representative

Attest:
(Seal):

Title

NOTE: This form is to be used as a companion document to AIA DOCUMENT G706, CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND
CLAIMS, Current Edition

**CONSENT OF SURETY
TO REDUCTION IN OR
PARTIAL RELEASE OF RETAINAGE**

AIA DOCUMENT G707 A

OWNER ☐
ARCHITECT ☐
CONTRACTOR ☐
SURETY ☐
OTHER ☐

PROJECT:
(name, address)

TO (Owner)

ARCHITECT'S PROJECT NO:

CONTRACT FOR:

CONTRACT DATE:

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(here insert name and address of Surety as it appears in the bond).

, SURETY,

on bond of (here insert name and address of Contractor as it appears in the bond)

, CONTRACTOR,

hereby approves the reduction in or partial release of retainage to the Contractor as follows:

The Surety agrees that such reduction in or partial release of retainage to the Contractor shall not relieve the Surety
of any of its obligations to (here insert name and address of Owner)

, OWNER,

as set forth in the said Surety's bond.

IN WITNESS WHEREOF,
the Surety has hereunto set its hand this

day of 19

Surety

Signature of Authorized Representative

Attest:

(Seal):

Title

DRAFT AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

« »
« »

THE OWNER:

(Name, legal status and address)

«Greenburgh Central School District »« »
«475 W. Hartsdale Avenue »

THE ARCHITECT:

(Name, legal status and address)

« »« »
« »

TABLE OF ARTICLES

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. ~~Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.~~

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. The Work shall consist of all items specifically included in the Contract Documents as well as all additional items of work

which are reasonably inferable from that which is specified in order to complete the Work in accordance with the Contract Documents. Any differences between the requirements of the Drawings and the Specifications or any differences noted within the Drawings themselves or with the Specifications themselves have been referred to the Owner, and Architect by Contractor prior to the submission of bids and have been clarified by an Addendum or Bulletins issued to all bidders, as necessary. If any such differences or conflicts were not called to the Owner's and/or Architect's attention prior to submission of bids, the Architect shall decide which of the conflicting requirements will govern based upon the most stringent of the requirements, and subject to the approval of the Owner, the Contractor shall perform the Work at no additional cost and/or time to the Owner in accordance with the Architect's decision. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable therefrom as being necessary to produce the intended results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. The sections of this Specification are for convenience or reference and do not necessarily set limits of Subcontractors and shall not operate to make the Owner and arbiter to establish such limits.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time in connection with any failure by the Contractor or any Subcontractor to comply with the requirements of this Paragraph.

§ 1.3 Capitalization

§ 1.3.1 Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.3.2 Conflicts

Where discrepancies exist between Drawings and Specifications, or necessary measurements are missing, or Work specified or shown on Drawings is obviously incorrect or impossible to execute, or figures fail to check, the Contractor shall call these facts to the attention of the Architect. The Architect's decision as to the intention of the Documents shall be final and no Work shall start until all of these ambiguities or discrepancies have been interpreted by the Architect. All Subcontractors shall refer to all of the Drawings, including those showing primarily the Work of the mechanical, electrical, and other specialized trades, and to all of the sections of the Specifications, and shall perform all Work reasonably inferable therefrom as being necessary to produce the indicated results after notifying the Architect.

§ 1.3.3 Addenda and/or Bulletin, if necessary, shall take precedence over the original Specifications insofar as the definition, interpretation and intent of the Work are concerned.

§ 1.3.4 Where the Addenda and/or Bulletin causes change in the cost of the Work, the Contractor shall proceed as outlined in Article 7, Changes in the Work, and shall not interpret an Addenda and/or Bulletin as authorization to proceed with the changes. Any discrepancy between or with parts of the Contract Documents shall be immediately brought to the attention of the Architect and Owner, and no work affected by such discrepancy shall proceed or be undertaken in advance of the Architect or Owner's interpretation, except at the Contractor's own responsibility and complete risk.

§ 1.3.5 Reference in the Specifications or on the Drawings to any product, material, equipment or type or method of construction, by name, make, catalog number or other identifying symbol, shall be interpreted as establishing a standard of quality; and it shall not be construed as limiting competition in any manner.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Owner, Architect and the Architect’s consultants, as their rights may appear, shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Owner's or Architect's or Architect’s consultants’ reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect’s consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

.1 Owner:

.2 Contractor:

.3 Architect:

.4 Legal Counsel

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™ 2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA

Document E203™ 2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™ 2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor ~~to whom the Contractor has no reasonable objection and~~ whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, ~~or fails or refuses to carry out Work in accordance with the Contract Documents, or fails or refuses to provide a sufficient amount of properly supervised and coordinated labor, materials, or equipment so as to be able to complete the Work with the Contract Time or fails to remove and discharge (within ten days) any Lien filed upon Owner's property by anyone claiming by, through, or under Contractor, or disregards the instructions of Architect or Owner when based on the requirements of the Contract Documents,~~ the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. ~~The Owner may deduct such amounts from the Contract Sum.~~ If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

§ 2.5 Owner's Rights and Remedies

§ 2.5.1 The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights or remedies of the Owner (i) granted in the Contract Documents, (ii) at law or (iii) in equity. ~~In no event shall the Owner have any control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures, or for the safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted to the Owner in the Contract Documents.~~

§ 2.5.2 Breach and Default

- ~~1. If during the course of performance of the Contract the Contractor fails to perform obligations under the Contract, such failure shall be considered by the Owner to be a breach of the Contract Documents.~~
- ~~2. If during the performance of the Contract the Owner reasonably believes that the Contractor's performance is so inadequate so as to jeopardize the successful and timely completion of the Project, the Owner shall consider such inadequate performance by the Contractor to be in default of the~~

Contract Documents.

- .3 In the event of breach and/or default of the Contract Documents the Owner shall be entitled to all rights, remedies and relief which the Owner may obtain under the Contract Documents and pursuant to law or equity.

§ 2.5.3 Owner's Entitlement to Reimbursement and Set-Off

If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents (including, but not limited to, payment of mechanic's liens and payment for Owner's correction of Work), such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or if the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective Work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to (i) deduct an amount equal to that which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (ii) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that which the Owner is entitled.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner or Architect pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Owner or Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15 within five (5) business days of discovery, as a condition precedent to seeking payment of additional costs or seeking additional time. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner,

subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures. The Owner shall not be responsible for any claimed loss or damage for instructing the Contractor to perform the Work in accordance with applicable Federal, State or local laws, rules, regulations or codes.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

§ 3.3.5 The Contractor shall be responsible for the enforcement of the Project safety standards or requirements which may apply to this Project. In addition, the Contractor will respond with diligence and promptness to reports from the Owner and/or the Architect of potential violations of such programs by investigating such alleged violations and correcting such violations if they exist through the procedures outline in such programs. In the event that the Owner or Architect discovers a violation of any applicable safety program which the Owner or the Architect perceives in its discretion to be an immediate hazard or emergency, the Owner or Architect may act either in conjunction with the Contractor, if time permits, or in the place of the Contractor to remedy said immediate hazard or emergency. The responsibilities with respect to enforcement of safety programs, standards or requirements referred to herein shall in no way release, relieve or absolve the Contractor of responsibility for the safety of persons and property and for compliance with all federal, state and local statutes, rules and regulations, ordinances and order of any governmental authority applicable to the conduct of the Work with respect to this Project.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Owner and/or Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make modifications or substitutions to the Work only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. Any request by the Contractor to make modifications or substitutions to the Work shall not in any way cause or result in the delay of the ordering of any materials or equipment or the scheduling of the Work. Any such request shall require a minimum of thirty days notice to the Owner and Architect and shall include full documentation of all costs and the time necessary. The full cost of reviewing any

request by the Contractor for a modification or substitution, including, but not limited to, the cost of any fees for the review of such request by the Owner and Architect and any additional time shall be borne by the Contractor.

§ 3.4.2.1 By making requests for substitutions, based on Subparagraph 3.4.2 above, the Contractor:

- .1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- .2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for what was originally specified;
- .3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which shall subsequently become apparent; and
- .4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.3 The Contractor also specifically warrants to the Owner that, as of the date the Owner takes possession and with respect to the Contractor's Work, the Project is built and constructed in accordance with the Drawings and Specifications. These warranties shall terminate one year after the Owner takes possession, except that such warranties shall survive until the earlier of the time provided by law or as set out in the Specifications or the date which is three years after the date the Owner takes possession, as to the defective conditions (including, without limitation, conditions which do not comply with the Drawings and Specifications or applicable law) which could not be discovered by Owner and/or Architect in the exercise of reasonable care within one year after the Owner takes possession. Should the Owner and/or Architect discover any deficiency that requires repair and/or replacement, Contractor shall correct such deficiency to their respective satisfaction within thirty (30) days following receipt of a notice from the Owner or Architect, at Contractor's sole cost and expense.

§ 3.5.4 The Contractor shall receive and/or provide or assign all manufacturers' warranties for materials or equipment to the Owner for the benefit of the Owner. Portions of the Work or equipment that typically carry long-term warranties, such as the roof and the heating, ventilation and air-conditioning, plumbing and sprinkler systems, shall carry such warranties as are provided for the Specifications or, at a minimum, those warranties as are typically provided by the manufacturer.

§ 3.6 Taxes

The Contractor shall pay any sales, consumer, use and similar taxes that are due for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.2.1 The Contractor shall also comply with and give notice to the Owner and/or Architect fourteen (14) days prior to the date that the Work is ready for inspection so that the Owner and/or Architect can perform the applicable inspections.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.3.1 Contractor certifies to the Owner and Architect that: (i) Contractor is in full compliance with the immigration laws of the United States relating to the Contractor's employees assigned to perform services for the Project; (ii) all of Contractor's employees are authorized by law to work in the United States and have presented documentation to Contractor that establishes both identity and work authorization, in accordance with applicable immigration regulations (and to the best of Contractor's knowledge, information and belief, the documentation presented to Contractor is genuine and accurate); and (iii) Contractor complies with all federal, state and local labor and employment laws, and wage and hour laws, as these laws may relate to Contractor's employees performing services for the Project (collectively, the laws referenced in this paragraph shall be referred to as the "Immigration and Employment Laws"). On the date Owner takes possession of the Project, Contractor shall be deemed to have certified that it has complied with the Immigration and Employment Laws during the period of time from the date of the Contract through and including the date of delivery of possession of the Project to Owner. Contractor shall require, in the contracts with its Subcontractors, that each such Subcontractor make the same certification and covenants as set forth above. Notwithstanding anything to the contrary contained herein, in no event shall Owner have any liability for any misrepresentation by the Contractor or any of its Subcontractors with respect to the matters stated in this Section which shall be the sole responsibility of the Contractor.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 44-3 business days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name, [address, home, site and cell telephone numbers](#) and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the [Owner and/or](#) Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the [Owner and/or](#) Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the [Owner's and/or](#) Architect's approval. ~~The Architect's approval shall not be unreasonably delayed or withheld.~~ The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the [Owner and/or](#) Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

[§ 3.10.4 All of the dates in any of the schedules of the Work prepared by the Contractor and submitted to the Architect, including any milestone and submittal dates, shall be considered to be "time of the essence" and may not be changed or modified without the Owner's and Architect's specific written approval.](#)

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities

for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor and/or to deduct such costs and expenses from the Contract Sum.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

§ 3.17.1 The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular

manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.17.2 The Contractor may make no use of any of the Contract Documents, including, but not limited to, the Drawings and Specifications, without the specific written approval of the Owner and/or Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, its Board of Education members, attorneys, officers, employees, representatives and agents, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, liabilities, professional fees, losses, and expenses, including but not limited to attorneys' fees, costs, Court costs, expenses and disbursements, arising out of, or in connection with, or resulting from the performance of the Work or related to (in whole or in part), (1) the Work performed hereunder, (2) the Contract Documents, or (3) the act or omission of the Contractor, Subcontractor or any individual, partnership, joint venture, limited liability company, corporation, or other entity (a) directly or indirectly employed by Contractor, or a Subcontractor, or (b) for whose acts or omissions of Contractor or a Subcontractor may be liable, provided that such claim, suit, damage, liability, professional fee, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), or property damage (including the use thereof), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable (this indemnification hereunder includes, but is not limited to, liability of the Contractor, Subcontractor, any one directly or indirectly employed by them, or anyone for whose acts they may be liable arising by operation of law).-

*Regardless of whether or not such claim, damage, liability, professional fee, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18. The obligations of the Contractor under this section shall survive the expiration of the Contract Documents. This indemnification specifically contemplates full indemnity in the event of liability imposed against the Owner and/or Architect without negligence and solely by reason of statute, operation of law or otherwise and partial indemnity in the event of any actual negligence on the part of the Owner and/or Architect either causing or contributing to the underlying claim, in which event indemnification will be limited to any liability imposed over and above that percentage attributable to actual fault, whether by statute, by operation of law or otherwise. The Contractor's indemnity obligations under this paragraph shall, but not by way of limitation, specifically include all claims and judgments which may arise against the Owner, its Board of Education members, attorneys, officers, employees, representatives and agents, and/or Architect, and the agents and employees of any of them or of any item under any applicable statute, rule or regulation.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

Commented [u1]: Please have the District consult with NYSIR to see if this indemnification provision adequately protects the District from liability.

§ 4.2.2 The [Owner or](#) Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, [to perform such inspections or observations as are necessary, to review and approve change orders, claims of any kind and Progress and Final Applications for Payment](#) and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the [Owner and/or](#) Architect considers it necessary or advisable, the [Owner and/or](#) Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the [Owner and/or](#) Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding [any](#) concealed and unknown conditions [claimed by the Contractor as provided in Section 3.7.4](#).

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the

Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Owner and/or Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Owner and/or Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

§ 5.3.1 By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.2 All portions of the Work that the Contractor does not perform itself shall be performed under subcontracts or by other appropriate agreement with the Contractor. All subcontracts (and such other appropriate agreements) shall be evidenced by a written agreement that substantially conforms to a subcontract form agreed to in advance between Owner and Contractor or as otherwise approved by Owner. Each such subcontract shall, where the context so requires, contain provisions that:

- .1 require such Work to be performed in accordance with the requirements of the Contract Documents;
- .2 waive all rights the contracting parties may have against one another or that a Subcontractor may have against the Owner or Architect for damages caused by fire or other perils covered by the insurance described in the Contract Documents;
- .3 require the Subcontractor to carry and maintain insurance coverage in accordance with the Contract Documents, and to file certificates of such coverage with the Contractor;
- .4 require the Subcontractor to submit certificates and waivers of liens for work completed by it and by its Sub-subcontractors as a condition to the disbursement of the progress payment next due and owing;
- .5 require submission to Contractor or Sub-subcontractor, as the case may be, of applications for payment in the form approved by the Owner, together with clearly defined invoices and billings supporting all such applications under each subcontract to which the Contractor is a party;
- .6 report, so far as practicable, unit prices and any other feasible formula for use in the determination of costs of changes in the Work;
- .7 require each Subcontractor to furnish to the Contractor in a timely fashion all information necessary for the preparation and submission of the reports required herein;
- .8 require that each Subcontractor continue to perform under its subcontract in the event the Contract terminated and the Owner shall take an assignment of said subcontract and request such Subcontractor to continue such performance;
- .9 require each Subcontractor to remove all debris created by its activities;
- .10 All subcontracts shall be in writing and shall specifically provide that the Owner is an intended third-party beneficiary of such subcontracts.
- .11 The Contractor shall ensure that each Subcontractor shall cooperate with all other Subcontractors employed on the Project in order to avoid complications and insure an acceptable workmanship in every respect and, in the manufacturing, assembling and erection of its Work.

§ 5.3.3 The Contractor shall not enter into any subcontract, contract, agreement, purchase order or other arrangement for the furnishings of any portion of the materials, services, equipment or Work with any party or entity if such party or entity is an Affiliated Entity, unless such Arrangement has been approved by the Owner, after full disclosure in relationship and all details relating to the proposed Arrangement. The term "Affiliated Entity" means any entity related to or affiliated with the Contractor with respect to which the Contractor has direct or indirect ownership or control, including, without limitation:

- .1 any entity owned in whole or in part by the Contractor;

- .2. any holder of more than 10% of the issued and outstanding shares of, or the holder of any interest in, the Contractor; or
- .3. any entity in which any officer, director, employee, partner or shareholder or member of the family of any of the foregoing persons of the Contractor or any entity owned by the Contractor has a direct or indirect interest, which interest includes, but is not limited to, that of a partner, employee, agent or shareholder.

§ 5.3.4 The Contractor shall promptly notify the Owner and Architect of any material defaults by any Subcontractors. Notwithstanding any provision contained in Article 5 to the contrary, it is hereby acknowledged and agreed that the Owner has in no way agreed, expressly or implied, nor will the Owner agree, to allow any Subcontractor or other material supplier or worker employed by the Contractor the right to obtain a judgment or decree against the Owner for any amount due it from the Contractor.

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

- § 5.4.1** Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that
- .1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
 - .2** assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right, without being deemed to have accepted possession of the Project, to take measurements, perform to perform construction or any operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project or engages in any of the activities set out in Section 6.1.1 with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible. Any costs that are found to be the responsibility of the Contractor may be deducted from the Contract Sum.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.1.1 Except as permitted in Paragraph 7.3, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that the Owner has been unjustly enriched by any alteration or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim for increase in any amounts due under the Contract Documents or for a change in any time period provided for in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.1.4 Any request for a change in the Work shall include the Contractor's request for both a monetary sum and any additional time. Failure of the Contractor to provide for either the monetary sum or any additional time in a request for a change in the Work shall be presumptive evidence of the waiver of any claim for either the monetary sum or additional time, as applicable, in relation to the request for a change in the Work.

§ 7.1.5 The Contractor shall not request, nor shall the Architect approve, Change Orders or Construction Change Directives aggregating a total of greater than ten (10%) percent of the Contract Sum. It shall be a condition precedent to payment for any Change Order or Construction Directive exceeding said percentage that Contractor obtain a specific modification of the Contract Documents and the written approval of both the Owner and Architect. The failure of the Contractor to obtain such a modification shall be a bar to the payment of any sum exceeding ten (10%) percent of the Contract Sum.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect and/or Owner shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, ~~including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount.~~ In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable ~~insurance; payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;~~

- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect and/or Owner. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit, if any, shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect and/or Owner will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect and/or Owner determines, in the Architect's and/or Owner's professional judgment, to be reasonably justified. The Architect's and/or Owner's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect and/or Owner concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect and/or Owner will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect, after conferring with and obtaining the consent and agreement of the Owner, may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee, agent, consultant or representative of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect and/or Owner may determine.

§ 8.3.1.1 In the event the Contractor delays the Work so that milestone dates, Substantial Completion, or Final Completion are not achieved within the time periods specified for the Contractor for completion of Work in the Contract Documents, which delay is unreasonable and not justified pursuant to Article 8.3.1 hereof, then in such event this shall serve as an independent basis to terminate the Contract pursuant to Article 14.2 and allow the Owner to remedy the matter, and any additional costs or damages incurred by Owner shall be immediately due and owing from Contractor herein.

§ 8.3.1.2 An extension or extensions, of time may be granted subject to the provisions of this article, but only after written application thereof by the Contractor in accordance with the Contract Documents.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 Neither the Contractor nor any Subcontractor or supplier may make any claim for damages based upon a delay or alleged delay caused by the Owner. The Contractor's, Subcontractor's or supplier's sole remedy or compensation for any delay shall be an extension of time, when properly applied for in accordance with Article 15 herein and only as approved in writing by the Owner and Architect. The Contractor shall notify each Subcontractor and supplier of this requirement of the Contract and include it in each of its subcontracts or purchase orders. This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect and/or Owner before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect and/or Owner. This schedule, unless objected to by the Architect and/or Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and/or Owner and supported by such data to

substantiate its accuracy as the Architect and/or Owner may require, and unless objected to by the Architect and/or Owner, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect and Owner an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner and/or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. Any allowances included in the Application for Payment shall be separately itemized with supporting data attached. The Application for Payment shall be accompanied by a certification by an officer of Contractor to the effect that (1) there are no known mechanics', materialmen's, or laborers' liens or claims or any other liens or claims, legal or equitable, contractual, statutory, or constitutional, outstanding or known to exist at the date of this Application; (2) all due and payable bills with respect to the Work have been paid to date or are included in the amount requested in the current Application and there is now no basis for the filing of any mechanics', materialmen's or laborers lien or claim or any other lien or claim, legal or equitable, contractual, statutory, or constitutional, on the Work; (3) waivers and releases from all Subcontractors, laborers, and materialmen for Work done and materials furnished have been obtained in such form as to constitute an effective waiver and release of all such liens and claims under the laws of the state within which the Project is located. These shall be delivered to Architect together with Contractor's waiver and release of liens and claims at the time of submission of the Application for Payment; and (4) certified payroll records of the Contractor and all Subcontractors pursuant to the New York State Labor Law.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect and/or Owner, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, because of a dispute or other reason, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.3.4 The Contractor shall provide the Owner with partial or final (as applicable) Waivers and Releases of Liens for it and from all of its Subcontractors and suppliers with each Application for Payment (of any type). The time for the Owner to make any payment shall only commence upon the receipt of these Waivers and Releases and the approval by the Architect of any Application for Payment.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in

Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated; the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed (including, but not limited to, Mechanic's Liens filed by Subcontractor or supplier) or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor (including, but not limited to, proof of the discharge of a Mechanic's Lien by bonding or deposit);
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; ~~or~~
- .7 repeated failure to carry out the Work in accordance with the Contract Documents; ~~or~~
- .8 failure to comply with scheduled milestone or submittal dates for the Work.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 ~~If the Architect withholds certification for payment under Section 9.5.1.3, the~~ The Owner may, in all instances and at its sole option and discretion, issue joint checks to the Contractor and to any Subcontractor or supplier ~~to whom the Contractor failed to make payment~~ for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the ~~Contractor shall reflect such payment on its next Certificate Application~~ for Payment shall reflect such payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner, its Board of Education members, attorneys, officers, employees, representatives and agents from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Owner and Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Owner and/or Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; ~~and fix the time~~ within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof as allowed pursuant to AIA Document A101. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.8.6 Anything to the contrary notwithstanding, the term "Substantially Complete", as used herein, shall be defined to mean the Contractor being able to deliver possession of the Project to the Owner with the following conditions fully performed, satisfied and complied with: (i) the construction Work shall have been fully completed in accordance with the requirements of the Drawings and Specifications approved by the Owner and Architect; (ii) a certificate being provided by the Architect (in a form and substance reasonably acceptable to the Owner) certifying that all work has been performed in accordance with the Drawings and Specifications approved by the Owner and Architect; and (iii) all conditions and obligations of Contractor to be then performed have been completed and satisfied.

§ 9.8.7 The Contractor shall cooperate with the Owner and the Architect and use its best efforts to perform all the Work and provide all the information and documentation necessary to obtain a temporary and/or final Certificate of Occupancy, whether or not substantial completion has been achieved.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 The Owner reserves the right to occupy any part of the completed or partially completed portion of the Project with the understanding that such ~~Unless otherwise agreed upon~~, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents ~~in whole or in part thereof, and the guarantee(s) / warranty(ies) described elsewhere in the Contract Documents shall not commence until a Certificate of Substantial Completion for a portion of the Project has been issued by the Architect.~~

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Owner and/or Architect will promptly make such inspection. When the Owner and/or Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Owner and Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

~~§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.~~

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of ~~special~~ warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.10.6 The Contractor shall keep full and detailed records and accounts related to the Cost of the Work and exercise such controls as may be necessary for proper financial management under this Contract and to substantiate all costs incurred. The accounting and control systems shall be satisfactory to the Owner. The Owner and the Owner's auditors shall, during regular business hours and upon reasonable notice, be afforded access to, and shall be permitted to audit and copy, the Contractor's records and accounts, including complete documentation supporting accounting entries, books, job cost reports, correspondence, instructions, drawings, receipts, subcontracts, Subcontractor's proposals, Subcontractor's invoices, purchase orders, vouchers, memoranda, and other data relating to this Contract. The Contractor shall preserve these records, for a period of three years after final payment, or for such longer period as may be required by law.

§ 9.10.7 When the Contractor believes that all the Work required by the Agreement has been fully performed, the Contractor shall deliver to the Owner's auditors a final accounting of the Cost of the Work.

§ 9.10.8 The Owner's auditors will review and report in writing on the Contractor's final accounting within 30 days after delivery of the final accounting to the Architect by the Contractor. Based upon such Cost of the Work as the Owner's auditors report to be substantiated by the Contractor's final accounting, and provided the other conditions of Section 4.2.1 of the Agreement have been met, the Architect will, within seven days after receipt of the written report of the Owner's auditors, either issue to the Owner a final Certificate for Payment with a copy to the Contractor, or notify the Contractor and Owner in writing of the Architect's reasons for withholding a certificate as provided in Section 15.4.3 of the Agreement. The Architect is not responsible for verifying the accuracy of the Contractor's final accounting.

§ 9.10.9 If the Owner's auditors' report concludes that the Cost of the Work as substantiated by the Contractor's final accounting is less than claimed by the Contractor, the Contractor shall be entitled to request mediation of the dispute without a further decision of the Architect. A request for mediation shall be made by the Contractor within 30 days after the Contractor's receipt of a copy of the Architect's final Certificate for Payment. If the Contractor fails to request mediation within this 30-day period, the substantiated amount reported by the Owner's auditors shall become binding on the Contractor. Pending a final resolution of the disputed amount, the Owner shall pay the Contractor the amount, if any, determined by the Owner's auditors to be due the Contractor.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. ~~The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.~~ The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents and compliance with all Federal, State and local laws, rules and regulations regarding safety. This person shall possess the applicable site safety licenses and any and all certificates required by applicable law for the Project site and shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately, and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shut down, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement, [Exhibit A](#) or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, [as applicable](#).

~~§ 11.2.2 **Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.~~

~~§ 11.2.3 **Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual~~

cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The ~~Owner and~~ Contractor waives all rights against (1) ~~the Owner, its Board of Education members, attorneys, officers, employees, representatives and agents, each other and any of their~~ the Owner's separate contractors, subcontractors, sub-subcontractors, suppliers, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by ~~property insurance required by the Agreement or~~ other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. ~~The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors.~~ The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the ~~Contract Sum and~~ Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2, except as to the corrective Work performed and subject to the continued existence of any manufacturers warranty, if applicable.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located. ~~Any claim arising out of or related to the Contract, except claims relating to aesthetic effect and those waived, shall, after decision by the Architect or thirty (30) days after submission to the Architect, be subject to litigation only in the New York State Supreme Court, County of Nassau. Both the Owner and Contractor consent to the jurisdiction and venue of said Court. Nothing contained herein shall be deemed to modify any period of limitations, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.~~

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, ~~the Contractor may not assign neither party to the Contract shall assign~~ the Contract as a whole without the written consent of the ~~other~~ Owner, which shall not unreasonably be withheld. If ~~the Contractor either party~~ attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the ~~Owner Contractor~~ shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall coordinate inspections and give the Owner, Architect timely notice of when and where tests and inspections are to be made so that the Owner, Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the ~~Owner Architect~~ will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to chosen by the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Owner, Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by

such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.6 New York State Education Department Approval

§ 13.6.1 The Contractor acknowledges that the approval of the Work or pricing must comply with the rules of the New York State Education Department ("NYSED"). No modifications in the Work or pricing or payments or periods of time may be made without NYSED's specific approval, if applicable. Any application for any modification of or changes to the Work or for pricing or payments, or changes or delay in periods of time shall include all documentation that may be required by NYSED.

§ 13.7 Liens

§ 13.7.1 If the Contractor or any of its Subcontractors or suppliers should cause a Mechanic's Lien to be placed upon the Owner's property, then the Contractor shall be liable for any and all legal or bonding or insurance fees related to the removal of the Mechanic's Lien or the defense of any Mechanic's Lien enforcement or foreclosure proceeding. Such legal or bonding or insurance fees shall be a deduction by the Owner from the Contract Sum.

§ 13.8 Damage to Property

§ 13.8.1 The Contractor shall be responsible for the maintenance of satisfactory and peaceful relations with the owners of all properties neighboring the Project (including those properties within a reasonable range of the Project that may be affected thereby) and shall be careful to cause no damage, disturbance or inconvenience (other than is normally attendant to a construction project) to such neighboring property owners. Contractor shall not be granted any changes in the Work of any kind (time, payments, scope or nature) and shall be responsible for all costs or delays incurred by the Owner should Contractor cause damage, disturbance or inconvenience to neighboring property owners.

§ 13.8.2 The Contractor shall take no action nor create any condition which will in any way cause damage or disturbance or undermine any existing element of the Project or its surrounding or adjoining areas.

§ 13.8.3 The Contractor shall specifically use its best efforts to maintain a satisfactory and peaceful relationship with the property owners who adjoin or are adjacent to the Project site (the "Adjoining Property"), including, but not limited to, avoiding damage to the Adjoining Property and any wall or structure thereon and conducting, if allowed, a full engineering and photographic survey of the Adjoining Property to record its condition prior to the commencement of the Work.

§ 13.9 Labor Relations

§ 13.9.1 No change in the Work of any kind (time, payments, scope or nature) shall be approved in relation to any labor dispute or related delay, unless requested by the Owner.

§ 13.10 Performance During Disputes

§ 13.10.1 In the event of any dispute between the Owner and Contractor, Contractor shall proceed expeditiously with the performance of the Work, under protest, maintaining a full record of all its labor, time and material costs, which shall be subject to such claims procedure as is otherwise set out in the Contract.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; ~~or~~
- ~~.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.~~

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, unless the Owner agrees to adjust the Contract Sum, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case

may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. ~~Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent~~

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 ~~In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, and any deposits or down payments which the Contractor has made pursuant to this Contract which cannot, in the exercise of good faith and due diligence by the Contractor, be refunded or applied as a credit in the Contractor's favor; provided, however, that if such deposits or down payments are not refundable, Contractor shall assign the applicable subcontract, agreement, purchase order, etc., to the Owner who, at its election, may require performance of same.~~

~~In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.~~

§ 14.5 Wage Rates Requirements

§ 14.5.1 This Contract is subject to New York State Department of Labor prevailing wage rates. A schedule of the current prevailing minimum wage rates has been provided to the Contractor. All provisions of the Prevailing Wage Law shall be strictly followed.

Commented [u2]: Remember to provide a schedule of the current prevailing minimum wage rates to the Contractor for every project.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within ~~ten (10) business~~ 24 days after occurrence of the event giving rise to such Claim or within ~~24~~ ten (10) business days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The times provided herein for the making of claims shall be considered "of the essence" to any payment for such claims or the granting or any extension of time. Failure of the Contractor to comply with the time and notice provisions of this Article 15 shall be a bar to making any payment to or extending the time of the Contractor for such claim. All claims of any type seeking any monies or an extension of time shall be accompanied by documentation as complete as practicable at the time of submission. A claim submitted without such documentation shall be rejected by the Owner and Architect and, if not timely resubmitted, within the original time period, as set forth above, or not more than three business days after receipt of a Notice of Rejection from the Architect, shall be waived. An application for Payment shall not be considered a claim.

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- 1—damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- 2—damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision, rendered within a reasonable time, shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ~~ten~~ thirty (30) days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, ~~the Owner may,~~ but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by non-binding mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement or with such other alternative dispute resolution organization or an individual Mediator acceptable to both parties. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, ~~mediation~~ mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of ~~60~~30 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings. The Mediation shall be conducted in a one-day session, with the principals of both of the parties attending, unless a further session is scheduled by mutual agreement.

~~§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.~~

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

~~§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.~~

~~§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.~~

~~§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.~~

~~§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.~~

§ 15.4.4 Consolidation or Joinder

~~§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).~~

~~§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined~~

consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

ARTICLE 16 CONTRACTOR'S FINANCIAL RESPONSIBILITY

§ 16.1 All costs due to the acts or omissions of the Contractor, either for correcting defective Work or for disposing of materials wrongly supplied, or for the remedying of damage to property caused by the fault or neglect of the Contractor, or any of its Subcontractors, agents or employees, shall be borne by the Contractor, and the Owner may withhold money due to the Contractor to cover any such costs already paid by the Owner as part of the cost of the Work.

§ 16.2 All costs in addition to the specified liquidated damages due to acts or omissions of the Contractor for additional time spent by the Architects and Engineers to review, comment, direct and/or otherwise process and administer more than two (2) submissions required of the Contractor as described in the Contract Documents, of any phase of construction administration, shall be chargeable to the Contractor and the Owner may withhold such amounts from the Contract sum with the Contractor.

ARTICLE 17 EQUAL OPPORTUNITY

§ 17.1 To the extent required by the New York State Human Rights Law (Article 15 of the Executive Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor shall not discriminate against any employee or applicant for employment due to race, creed, color, disability, sex, national origin, sexual orientation, age, predisposing genetic characteristics, familial status, military status, gender identity or expression, domestic violence victim status or marital status. In addition, the Contractor agrees that neither it nor its Subcontractors shall by reason of race, creed, color, disability, sex, or national origin, discriminate in hiring against any citizen of New York State who is qualified and available to perform the work to which the employment relates. No contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, creed, color, disability, sex or national origin. There may be deducted from the amount payable under the contract, a penalty of fifty dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of the contract. The contract may be cancelled or terminated by the State or municipality and all moneys due or to become due hereunder may be forfeited for a second or any subsequent violation of these terms or conditions. This provision shall be limited to operations performed within the territorial limits of the State of New York.



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Greenburgh CSD

James Weydig, Senior Associate
BBS Architects Engineers
244 East Main St
Patchogue NY 11772

Schedule Year 2021 through 2022
Date Requested 12/30/2021
PRC# 2021013261

Location Highview ES
Project ID# 660407061002013
Project Type Phase 1 capital projects

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 2021 through June 2022. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Greenburgh CSD

James Weydig, Senior Associate
BBS Architects Engineers
244 East Main St
Patchogue NY 11772

Schedule Year 2021 through 2022
Date Requested 12/30/2021
PRC# 2021013254

Location Lee F Jackson ES
Project ID# 660407061006011
Project Type Phase 1 capital projects

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.

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Kathy Hochul, Governor

Roberta Reardon, Commissioner

Greenburgh CSD

James Weydig, Senior Associate
BBS Architects Engineers
244 East Main St
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Schedule Year 2021 through 2022
Date Requested 12/30/2021
PRC# 2021013259

Location RJ Bailey ES
Project ID# 660407061005012
Project Type Phase 1 capital projects

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.

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Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Greenburgh CSD

James Weydig, Senior Associate
BBS Architects Engineers
244 East Main St
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Schedule Year 2021 through 2022
Date Requested 12/30/2021
PRC# 2021013255

Location Woodlands MS HS
Project ID# 660407061005012
Project Type Phase 1 capital projects

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.

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NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Greenburgh CSD

James Weydig, Senior Associate
BBS Architects Engineers
244 East Main St
Patchogue NY 11772

Schedule Year 2021 through 2022
Date Requested 12/30/2021
PRC# 2021013256

Location Early Childhood Program
Project ID# 660407061011008
Project Type Phase 1 capital projects

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 2021 through June 2022. 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.

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Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission; a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion [online](#).

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

There are very few exceptions to this rule. Complete information regarding these exceptions is available on the ["Request for a dispensation to work overtime" form \(PW30\)](#) and ["4 Day / 10 Hour Work Schedule" form \(PW 30.1\)](#).

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, 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 journeymen 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 journeyman's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12240 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of \$50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Greenburgh CSD

James Weydig, Senior Associate
BBS Architects Engineers
244 East Main St
Patchogue NY 11772

Schedule Year 2021 through 2022
Date Requested 12/30/2021
PRC# 2021013261

Location Highview ES
Project ID# 660407061002013
Project Type Phase 1 capital projects

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 12240

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to \$1,500 for a first offense and up to \$5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, www.labor.ny.gov. <https://labor.ny.gov/formsdocs/ui/IA999.pdf>

If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage and supplement rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her job classification. The required notification will be provided with each wage schedule, may be downloaded from our website www.labor.ny.gov or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(12.20)

**To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND**

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12240

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.



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.

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:**
www.labor.ny.gov

If you feel that you have not received proper wages or benefits,
please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5156		

* For New York City government agency construction projects, please
contact the Office of the NYC Comptroller at (212) 669-4443, or
www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is \$250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training "prior to the performing any work on the project."

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.*)
- Training roster, attendance record 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 12240

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Westchester County General Construction

Boilermaker

01/01/2022

JOB DESCRIPTION Boilermaker

DISTRICT 4

ENTIRE COUNTIES

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

WAGES

Per Hour: 07/01/2021

Boilermaker	\$ 63.38
Repairs & Renovations	63.38

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

Boilermaker	32% of hourly
Repair & Renovations	Wage Paid
	+ \$ 25.38

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

Repairs & Renovation Includes replacement of parts and repairs & renovation of existing unit.

OVERTIME PAY

See (D, O) on OVERTIME PAGE

Repairs & Renovation see (B,E,Q)

HOLIDAY

Paid: See (8, 16, 23, 24) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 12, 15, 16, 22, 23, 24, 25) on HOLIDAY PAGE

NOTE: *Employee must work in pay week to receive Holiday Pay.

**Employee gets 4 times the hourly wage rate for working Labor Day.

REGISTERED APPRENTICES

Wage per hour:

(1/2) Year Terms at the following percentage of Boilermaker's Wage

1st	2nd	3rd	4th	5th	6th	7th
65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits Per Hour:

	07/01/2021
Apprentice(s)	32% of Hourly
	Wage Paid Plus
	Amount Below

1st Term	\$ 19.41
2nd Term	20.26
3rd Term	21.11
4th Term	21.96
5th Term	22.82
6th Term	23.68
7th Term	24.52

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

4-5

Carpenter

01/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

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

WAGES

Per hour: 07/01/2021

Piledriver	\$ 56.93
Dockbuilder	\$ 56.93

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 53.33

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
\$23.37	\$28.97	\$37.35	\$45.74

Supplemental benefits per hour:

All Terms: \$ 35.33

8-1556 Db

Carpenter

01/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

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

WAGES

Per hour: 07/01/2021

Carpet/Resilient

Floor Coverer \$ 54.75

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 46.97

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE.

Paid for 1st & 2nd yr.

Apprentices See (5,6,11,13,16,18,19,25)

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

REGISTERED APPRENTICES

Wage per hour - (1) year terms:

1st	2nd	3rd	4th
\$ 24.55	\$ 27.55	\$ 31.80	\$ 39.68

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 16.19	\$ 17.69	\$ 21.29	\$ 23.29

8-2287

Carpenter

01/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

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

WAGES

Per Hour: 07/01/2021

Marine Construction:

Marine Diver \$ 71.80
Marine Tender 51.34

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 53.33

OVERTIME PAY

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

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE

Overtime: See (5, 6, 10, 11, 13, 16, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms.

1st year \$ 23.37
2nd year 28.97
3rd year 37.35
4th year 45.74

Supplemental Benefits

Per Hour:

All terms \$ 35.33

8-1456MC

Carpenter

01/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

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

WAGES

Per hour: 07/01/2021

Building
Millwright \$ 57.00

SUPPLEMENTAL BENEFITS

Per hour:

Millwright \$ 54.60

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.
\$30.74	\$36.19	\$41.64	\$52.54

Supplemental benefits per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
------	------	------	------

\$35.03 \$38.73 \$43.08 \$49.84

8-740.1

Carpenter

01/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

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

WAGES

Per Hour:

07/01/2021

Timberman

\$ 52.05

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2021

\$ 52.78

OVERTIME PAY

See (B, E, E2, Q) 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:

One (1) year terms:

1st	2nd	3rd	4th
\$21.42	\$26.53	\$34.18	\$41.84

Supplemental benefits per hour:

All terms \$ 35.06

8-1556 Tm

Carpenter

01/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

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

PARTIAL COUNTIES

Orange: South of but including the following, Waterloo Mills, Slate Hill, New Hampton, Goshen, Blooming Grove, Mountainville, east to the Hudson River.

Putnam: South of but including the following, Cold Spring, TompkinsCorner, Mahopac, Croton Falls, east to Connecticut border.

Suffolk: West of Port Jefferson and Patchogue Road to Route 112 to the Atlantic Ocean.

WAGES

Per hour: 07/01/2021 10/18/2021

Core Drilling:

Driller \$ 41.74 \$ 42.27

Driller Helper 32.92 33.47

Note: Hazardous Waste Pay Differential:

For Level C, an additional 10% above wage rate per hour

For Level B, an additional 10% above wage rate per hour

For Level A, an additional 10% above wage rate per hour

Note: When required to work on water: an additional \$ 0.50 per hour.

SUPPLEMENTAL BENEFITS

Per hour:

Driller and Helper \$ 29.40 \$ 30.60

OVERTIME PAY

OVERTIME: See (B,E,K*,P,R**) on OVERTIME PAGE.

HOLIDAY

Paid: See (5,6) on HOLIDAY PAGE.

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

** See (8,10,11,13) on HOLIDAY PAGE.

8-1536-CoreDriller

Carpenter - Building / Heavy&Highway

01/01/2022

JOB DESCRIPTION Carpenter - Building / Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

WAGES

WAGES:(per hour)

07/01/2021

BUILDING/HEAVY & HIGHWAY/TUNNEL:

Carpenter

Base Wage

\$ 37.69

+ \$7.63*

*For all hours paid straight or premium.

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.

NOTE: Carpenters employed in the removal or abatement of asbestos or any toxic or hazardous material or required to work near asbestos or any toxic or hazardous material and required to wear protective equipment shall receive two (2) hours extra pay per day, plus applicable supplemental benefits.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker

\$ 31.91

OVERTIME PAY

BUILDING:

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

HEAVY&HIGHWAY/TUNNEL:

See (B, E, P, *R, **T, X) on OVERTIME PAGE.

*R applies to Heavy&Highway/Tunnel Overtime Holiday Code 25 with benefits at straight time rate.

**T applies to Heavy&Highway/Tunnel Overtime Holiday Codes 5 & 6 with benefits at straight time rate.

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 including benefits.

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

REGISTERED APPRENTICES

1 year terms at the following wage rates:

Indentured before July 1 2016

1st	2nd	3rd	4th
\$ 18.85	\$ 22.61	\$ 26.38	\$ 30.15
+3.57*	+3.57*	+3.57*	+3.57*

Indentured after July 1 2016

1st	2nd	3rd	4th	5th
\$ 18.85	\$ 22.61	\$ 24.50	\$ 26.38	\$ 30.15
+3.57*	+3.57*	+3.57*	+3.57*	+3.57*

*For all hours paid straight or premium

SUPPLEMENTAL BENEFITS per hour:

All terms \$ 16.28

11-279.1B/HH

Electrician

01/01/2022

JOB DESCRIPTION Electrician

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond, Westchester

WAGES

Per hour: 07/01/2021

Service Technician \$ 34.40

Service and Maintenance on Alarm and Security Systems.

Maintenance, repair and /or replacement of defective (or damaged) equipment on, but not limited to, Burglar - Fire - Security - CCTV - Card Access - Life Safety Systems and associated devices. (Whether by service contract of T&M by customer request.)

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker: \$ 19.32

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 17, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 17, 25, 26) on HOLIDAY PAGE

9-3H

Electrician

01/01/2022

JOB DESCRIPTION Electrician

DISTRICT 8

ENTIRE COUNTIES

Westchester

WAGES

Per hour: 07/01/2021 04/21/2022

*Electrician/A-Technician \$ 53.75 \$ 53.75

Teledata 53.75 53.75

*All new installations of wiring, conduit, junction boxes and light fixtures for projects with a base bid of more than \$325,000. For projects with a base bid of \$325,000 or less, see Maintenance and Repair rates.

Note: On a job where employees are required to work on bridges over navigable waters, transmission towers, light poles, bosun chairs, swinging scaffolds , etc. 40 feet or more above the water or ground or under compressed air, or tunnel projects under construction or where assisted breathing apparatus is required, they will be paid at the rate of time and one-half for such work except on normal pole line or building construction work.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 52.73 \$ 54.39

OVERTIME PAY

See (A, G, *J, P) on OVERTIME PAGE

*NOTE: Emergency work on Sunday and Holidays is at the time and one-half overtime rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following wage rates:

	07/01/2021	01/01/2022	04/21/2022
1st term	\$ 14.00	\$ 15.00	\$ 15.00
2nd term	16.00	16.00	16.00
3rd term	18.00	18.00	18.00
4th term	20.00	20.00	20.00
MIJ 1-12 months	24.00	24.00	25.00
MIJ 13-18 months	27.50	27.50	28.50

Supplemental Benefits per hour:

	07/01/2021	04/21/2022
1st term	\$ 10.15	\$ 10.82
2nd term	13.05	13.05
3rd term	14.39	14.39
4th term	15.72	15.72
MIJ 1-12 months	13.39	13.49
MIJ 13-18 months	13.76	13.87

8-3/W

Electrician

01/01/2022

JOB DESCRIPTION Electrician

DISTRICT 8

ENTIRE COUNTIES

Westchester

WAGES

	07/01/2021	04/21/2022
Electrician -M	\$ 27.50	\$28.50
H - Telephone	\$ 27.50	\$28.50

All work with a base bid amount of \$325,000 or less. Including repairs and /or replacement of defective electrical and teledata equipment, all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls, and washing and cleaning of foregoing fixtures.

*If the project exceeds \$375,000 due to changes in the scope of work, an Electrician/A Technician must be part of the labor ratio.

SUPPLEMENTAL BENEFITS

	07/01/2021	04/21/2022
Electrician &		
H - Telephone	\$ 13.76	\$13.87

OVERTIME PAY

See (B, G, *J, P) on OVERTIME PAGE

*Note: Emergency work on Sunday and Holidays is at the time and one-half overtime rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

8-3m

Elevator Constructor

01/01/2022

JOB DESCRIPTION Elevator Constructor

DISTRICT 4

ENTIRE COUNTIES

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

PARTIAL COUNTIES

Rockland: Entire County except for the Township of Stony Point

Westchester: Entire County except for the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per hour:		
	07/01/2021	03/17/2022
Elevator Constructor	\$ 72.29	\$ 75.14
Modernization & Service/Repair	56.77	59.09

Four(4), ten(10) hour days may be worked at straight time during a week, Monday thru Friday.

NOTE- In order to use the '4 Day/10 Hour Work Schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 IS NOT SUBMITTED you will be liable for overtime payments for work over the allotted hours per day listed.

SUPPLEMENTAL BENEFITS

Per Hour:

Elevator Constructor	\$ 41.92	\$ 43.914
Modernization & Service/Repairs	41.082	42.787

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 Journeymans wage of classification Working in.

6 MONTH TERMS:

1st Term* 50%	2nd & 3rd Term* 50%	4th & 5th Term 55%	6th & 7th Term 65%	8th & 9th Term 75%
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SUPPLEMENTAL BENEFITS

Elevator Constructor		
1st Term	\$ 0.00	\$ 0.00
2nd & 3rd Term	34.05	34.772
4th & 5th Term	34.91	35.606
6th & 7th Term	36.30	37.052
8th & 9th Term	37.70	38.497

Modernization & Service/Repair		
1st Term	\$ 0.00	\$ 0.00
2nd & 3rd Term	34.00	34.672
4th & 5th Term	34.50	35.195
6th & 7th Term	35.83	36.571
8th & 9th Term	37.15	37.938

4-1

Elevator Constructor	01/01/2022
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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	07/01/2021	01/01/2022
Mechanic	\$ 62.51	\$ 64.63
Helper	70% of Mechanic Wage Rate	70% of Mechanic Wage Rate

Four (4), ten (10) hour days may be worked for New Construction and Modernization Work at straight time during a week, Monday thru Thursday or Tuesday thru Friday.

***Four (4), ten (10) hour days are not permitted for Contract Work/Repair Work

NOTE - In order to use the '4 Day/10 Hour Work Schedule' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule', form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour	07/01/2021	01/01/2022
Journeyman/Helper	\$ 35.825*	\$ 36.885*

(*)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 Journeyman/Helper

1-138

Glazier	01/01/2022
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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:	7/01/2021	11/01/2021
Glazier	\$ 58.60	\$ 59.10
*Scaffolding	59.55	60.55
Glass Tinting & Window Film	29.60	29.60
**Repair & Maintenance	29.60	29.60

*Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 24' or more, but not pipe scaffolding.

**Repair & Maintenance- All repair & maintenance work on a particular building, whenever performed, where the total cumulative contract value is under \$148,837. All Glass tinting, window film, regardless of material or intended use, and all affixing of decals to windows or glass.

SUPPLEMENTAL BENEFITS

Per hour:	7/01/2021	11/01/2021
Journeyworker	\$ 36.04	\$ 36.79
Glass tinting & Window Film	21.19	21.19
Repair & Maintenance	21.19	21.19

OVERTIME PAY

See (B,H,V) on OVERTIME PAGE.

For 'Repair & Maintenance' and 'Glass Tinting & Window Film' see (B, B2, I, S) on overtime page.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (4, 6, 16, 25) on HOLIDAY PAGE

For 'Repair & Maintenance' and 'Glass Tinting & Window Film' Only

Paid: See(5, 6, 16, 25)

Overtime: See(5, 6, 16, 25)

REGISTERED APPRENTICES

Wage per hour:

(1) year terms at the following wage rates:

7/01/2021	11/01/2021
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1st term	\$ 20.72	\$ 21.00
2nd term	28.66	28.87
3rd term	34.67	34.94
4th term	46.62	47.01

Supplemental Benefits:

(Per hour)

1st term	\$ 16.58	\$ 16.80
2nd term	23.57	23.99
3rd term	26.09	26.57
4th term	30.91	31.52

8-1087 (DC9 NYC)

Insulator - Heat & Frost

01/01/2022

JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Orange, Putnam, Rockland, Westchester

WAGES

Per hour:	07/01/2021	05/31/2022
Insulator	\$ 56.25	+ \$ 2.00
Discomfort & Additional Training**	59.22	+ \$ 2.00
Fire Stop Work*	30.07	+ \$ 2.00

* Applies on all exclusive Fire Stop Work (When contract is for Fire Stop work only). No apprentices on these contracts only.

**Applies to work requiring: garb or equipment worn against the body not customarily worn by insulators; psychological evaluation; special training, including but not limited to "Yellow Badge" radiation training

Note: Additional \$0.50 per hour for work 30 feet or more above floor or ground level.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker	\$ 35.10
Discomfort & Additional Training	37.06
Fire Stop Work:	
Journeyworker	17.90

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
\$ 30.07	\$ 35.30	\$ 40.54	\$ 45.78

Discomfort & Additional Training Apprentices:

1st	2nd	3rd	4th
\$ 31.55	\$ 37.08	\$ 42.61	\$ 48.16

Supplemental Benefits paid per hour:

Insulator Apprentices:	
1st term	\$ 17.90
2nd term	21.35
3rd term	24.79
4th term	28.23

Discomfort & Additional Training Apprentices:	
1st term	\$ 18.89
2nd term	22.52
3rd term	26.16
4th term	29.80

8-91

Ironworker	01/01/2022
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JOB DESCRIPTION Ironworker

DISTRICT 9

ENTIRE COUNTIES

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

WAGES

Per Hour: 07/01/2021

Ironworker Rigger \$ 67.99

Ironworker Stone
Derrickman \$ 67.99

SUPPLEMENTAL BENEFITS

Per hour: \$ 41.44

OVERTIME PAY

See (B, D1, *E, Q, **V) on OVERTIME PAGE

*Time and one-half shall be paid for all work on Saturday up to eight (8) hours and double time shall be paid for all work thereafter.

** Benefits same premium as wages on Holidays only

HOLIDAY

Paid: See (18) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 25) on HOLIDAY PAGE

*Work stops at schedule lunch break with full day's pay.

REGISTERED APPRENTICES

Wage per hour:

1/2 year terms at the following hourly wage rate:

	1st	2nd	3rd	4th
07/01/2021	\$33.55	\$47.94	\$53.34	\$58.74

Supplemental benefits:

Per hour:				
07/01/2021	\$21.18	\$31.45	\$31.45	\$31.45

9-197D/R

Ironworker	01/01/2022
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JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

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

WAGES

Per Hour:	07/01/2021	01/01/2022
		Additional
		\$ 1.25

Ornamental	\$ 46.15
Chain Link Fence	46.15
Guide Rail	46.15

SUPPLEMENTAL BENEFITS

Per hour:	
Journeyworker:	\$ 60.05

OVERTIME PAY

See (B, B1, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

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

REGISTERED APPRENTICES

Apprentices hired before 8/31/2018:

(1/2) year terms at the following percentage of Journeyman's wage.

5th Term	80%
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Supplemental Benefits per hour:

5th Term	54.03
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Apprentices Hired after 9/1/18:

1 year terms

1st Term	\$ 20.63
2nd Term	24.22
3rd Term	27.80
4th Term	31.38

Supplemental Benefits per hour:

1st Term	\$ 17.89
2nd Term	19.14
3rd Term	20.40
4th Term	21.66

4-580-Or

Ironworker

01/01/2022

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

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

WAGES

PER HOUR:

	07/01/2021	01/01/2022
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Ironworker:

Structural	\$ 54.20	\$ 54.95
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Bridges

Machinery

SUPPLEMENTAL BENEFITS

PER HOUR PAID:

Journeyman	\$ 83.35	\$ 84.35
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OVERTIME PAY

See (B, B1, Q, *V) on OVERTIME PAGE

*NOTE: Benefits are calculated for every hour paid

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:

6 month terms at the following rate:

1st	\$28.21	\$28.59
2nd	\$28.81	\$29.19
3rd - 6th	\$29.42	\$29.80

Supplemental Benefits

PER HOUR PAID:

All Terms	\$56.90	\$58.42
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4-40/361-Str

Ironworker

01/01/2022

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

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

PARTIAL COUNTIES

Rockland: Southern section - south of Convent Road and east of Blue Hills Road.

WAGES

Per hour: 07/01/2021

Reinforcing &
Metal Lathing \$ 56.25

"Base" Wage \$ 54.70
plus \$ 1.55

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

SUPPLEMENTAL BENEFITS

Per hour:
Reinforcing & Metal Lathing \$ 38.30

OVERTIME PAY

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

*Only \$22.00 per Hour for non worked hours

Supplemental Benefit Premiums for Overtime Hours worked:

Time & One Half \$ 45.08
Double Time \$ 51.33

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 11, 13, 18, 19, 25) on HOLIDAY PAGE

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 BENEFITS

Per Hour:

1st term	2nd term	3rd term	4th Term
\$ 18.17	\$ 21.34	\$ 22.00	\$ 20.50

4-46Reinf

Laborer - Building

01/01/2022

JOB DESCRIPTION Laborer - Building

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

07/01/2021

Laborer \$ 36.40
plus \$5.05**

Laborer - Asbestos & Hazardous
Materials Removal \$ 43.10*

* Abatement/Removal of:

- Lead based or lead containing paint on materials to be repainted is classified as Painter.
- Asbestos containing roofs and roofing material is classified as Roofer.

** This portion is not subject to overtime premium.

NOTE: Upgrade/Material condition work plan for work performed during non-outage under a wage formula of 90% wage/100% fringe benefits at nuclear power plants.

SUPPLEMENTAL BENEFITS

Per hour: 07/01/2021

Journeyworker \$ 27.50

OVERTIME PAY

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

*Note: For Sundays and Holidays worked benefits are at the same premium as wages.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

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

REGISTERED APPRENTICES

LABORER ONLY

Hourly terms at the following wage:

Level A	Level B	Level C	Level D
0-1000	1001-2000	2001-3000	3001-4000
\$ 21.04	\$ 24.86	\$ 28.69	\$ 32.51

Supplemental Benefits per hour:

Apprentices
All terms \$ 21.15

8-235/B

Laborer - Heavy&Highway

01/01/2022

JOB DESCRIPTION Laborer - Heavy&Highway

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

****PUTNAM: APPLIES TO ALL HEAVY & HIGHWAY WORK EXCLUDING HIGHWAYS, STREETS, AND BRIDGES****

GROUP I: Blaster, Quarry Master, Curbs/Asphalt Screedman, Pipe Jacking and Boring Operations Operator, Qualified Dead Condition Pipe Fuser (B Mechanic)

GROUP II: Burner, Drillers(jumbo, joy, wagon, air track, hydraulic), Drill Operator, Self Contained Rotary Drill, Curbs, Raker, Bar Person, Concrete Finisher.

GROUP III: Pavement Breakers, Jeep Operator, Jack Hammer, Pneumatic Tools (all), Gas Driller, Guniting, Railroad Spike Puller, Pipelayer, Chain Saw, Deck winches on scows, Power Buggy Operator, Power Wheelbarrow Operator, Bar Person Helper, Compressed Air lance, Water Jet Lance.

GROUP IV: Concrete Laborers, Asph. Worker, Rock Scaler, Vibrator Oper., Bit Grinder, Air Tamper, Pumps, Epoxy (adhesives, fillers and troweled on), Barco Rammer, Concrete Grinder, Crack Router Operator, Guide Rail-digging holes and placing concrete and demolition when not to be replaced, distribution of materials and tightening of bolts.

GROUP V: Drillers Helpers, Common Laborer, Mason Tenders, Signal Person, Pit Person, Truck Spotter, Powder Person, Landscape/Nursery Person, Dump Person, Temp. Heat.

GROUP VIA: Asbestos/Toxic Waste Laborer-All removal (Roads, Tunnels, Landfills, etc.) Confined space laborer, Bio-remediation, Phyto-remediation, Lead or Hazardous material, Abatement Laborer.

Wages:(per hour) 07/01/2021

GROUP I \$45.65*
GROUP II 44.30*
GROUP III 43.90*

GROUP IV	43.55*
GROUP V	43.20*
GROUP VIA	45.20*
Operator Qualified	
Gas Mechanic(A Mech)	55.65*
Flagperson	36.85*

*NOTE: To calculate overtime premiums, deduct \$0.10 from above wages

SHIFT WORK: A shift premium will be paid on Public Work contracts for off-shift or irregular shift work when mandated by the NYS D.O.T. or other Governmental Agency contracts. Employees shall receive an additional 15% per hour above current rate for all regular and irregular shift work. Premium pay shall be calculated using the 15% per hour differential as base rate.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:

First 40 Hours	
Per Hour	\$26.10
Over 40 Hours	
Per Hour	19.85

OVERTIME PAY

See (B, E, P, R, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

NOTE: For Holiday Overtime: 5, 6 - Code 'S' applies
For Holiday Overtime: 8, 15, 25, 26 - Code 'R' applies

REGISTERED APPRENTICES

	1st term	2nd term	3rd term	4th term
	1-1000hrs	1001-2000hrs	2001-3000hrs	3001-4000hrs
07/01/2021	\$ 24.56	\$ 28.98	\$ 33.40	\$ 37.72

Supplemental Benefits per hour:

1st term	\$ 4.70 - After 40 hours: \$ 4.45
2nd term	\$ 4.80 - After 40 hours: \$ 4.45
3rd term	\$ 5.30 - After 40 hours: \$ 4.85
4th term	\$ 5.85 - After 40 hours: \$ 5.35

8-60H/H

Laborer - Tunnel

01/01/2022

JOB DESCRIPTION Laborer - Tunnel

DISTRICT 11

ENTIRE COUNTIES

Columbia, Dutchess, Greene, Orange, Otsego, Putnam, Rockland, Sullivan, Ulster, Westchester

PARTIAL COUNTIES

Chenango: Townships of Columbus, Sherburne and New Berlin.

Delaware: Townships of Andes, Bovina, Middletown, Roxbury, Franklin, Hamden, Stamford, Delhi, Kortright, Harpersfield, Merideth and Davenport.

WAGES

Class 1: All support laborers/sandhogs working above the shaft or tunnel.

Class 2: All laborers/sandhogs working in the shaft or tunnel.

Class 4: Safety Miners

Class 5: Site work related to Shaft/Tunnel

WAGES: (per hour)

	07/01/2021	07/01/2022
Class 1	\$ 51.95	\$ 53.45
Class 2	54.10	55.60
Class 4	60.50	62.00
Class 5	43.50	44.80

Toxic and hazardous waste, lead abatement and asbestos abatement work will be paid an additional \$ 3.00 an hour.

SHIFT DIFFERENTIAL...On all Government mandated irregular shift work:

- Employee shall be paid at time and one half the regular rate Monday through Friday.
- Saturday shall be paid at 1.65 times the regular rate.
- Sunday shall be paid at 2.15 times the regular rate.

SUPPLEMENTAL BENEFITS

Per hour:

Benefit 1	\$ 33.25	\$ 34.45
Benefit 2	49.81	51.60
Benefit 3	66.35	68.75

Benefit 1 applies to straight time hours, paid holidays not worked.

Benefit 2 applies to over 8 hours in a day (M-F), irregular shift work hours worked, and Saturday hours worked.

Benefit 3 applies to Sunday and Holiday hours worked.

OVERTIME PAY

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

HOLIDAY

Paid: See (5, 6, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 15, 16, 25) on HOLIDAY PAGE

When a recognized Holidays falls on Saturday or Sunday, holidays falling on Saturday shall be recognized or observed on Friday and holidays falling on Sunday shall be recognized or observed on Monday. Employees ordered to work on the Saturday or Sunday of the holiday or on the recognized or the observed Friday or Monday for those holidays falling on Saturday or Sunday shall receive double time the established rate and benefits for the holiday.

REGISTERED APPRENTICES

FOR APPRENTICE RATES, refer to the appropriate Laborer Heavy & Highway wage rate contained in the wage schedule for the County and location where the work is to be performed.

11-17/60/235/754Tun

Lineman Electrician

01/01/2022

JOB DESCRIPTION Lineman Electrician

DISTRICT 6

ENTIRE COUNTIES

Westchester

WAGES

Below rates apply to electrical overhead and underground distribution and maintenance work and overhead and underground transmission line work, electrical substations, switching structures, continuous pipe-type underground fluid or gas filled transmission conduit and cable installations, maintenance jobs or projects, railroad catenary installations and maintenance, third rail installations, the bonding of rails and the installation of fiber optic cable. (Ref #14.04.01)

Includes Teledata Work performed within ten (10) feet of high voltage (600 volts or over) transmission lines.

Per hour:	07/01/2021	05/02/2022	05/01/2023	05/06/2024
Lineman, Tech, Welder	\$ 57.71	\$ 59.01	\$ 60.41	\$ 61.91
Crane, Crawler Backhoe	57.71	59.01	60.41	61.91
Cable Splicer-Pipe Type	63.48	64.91	66.45	68.10
Digging Mach Operator	51.94	53.11	54.37	55.72
Cert. Welder-Pipe Type	60.60	61.96	63.43	65.01
Tractor Trailer Driver	49.05	50.16	51.35	52.62
Groundman, Truck Driver	46.17	47.21	48.33	49.53
Equipment Mechanic	46.17	47.21	48.33	49.53
Flagman	34.63	35.41	36.25	37.15

Additional \$1.00 per hour for entire crew when a helicopter is used.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM TO 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM REGULAR RATE PLUS 31.4%

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

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

	\$25.40 *plus 7% of hourly Wage	\$ 25.90 *plus 7% of hourly wage	\$ 26.40 *plus 7% of hourly wage	\$ 26.90 *plus 7% of hourly wage
Journeyman Lineman or Equipment Operators with Crane License	\$ 26.40 *plus 7% of hourly wage	\$ 27.90 *plus 7% of hourly wage	\$ 29.40 *plus 7% of hourly wage	\$ 30.90 *plus 7% of hourly wage

*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 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:

07/01/2021	05/02/2022	05/01/2023	05/06/2024
\$25.40 *plus 7% of hourly Wage	\$ 25.90 *plus 7% of hourly wage	\$ 26.40 *plus 7% of hourly wage	\$ 26.90 *plus 7% of hourly wage

*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249aWest

Lineman Electrician - Teledata

01/01/2022

JOB DESCRIPTION Lineman Electrician - Teledata

DISTRICT 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour:

For outside work, stopping at first point of attachment (demarcation).
07/01/2021

Cable Splicer	\$ 34.78
Installer, Repairman	\$ 33.01
Teledata Lineman	\$ 33.01
Tech., Equip. Operator	\$ 33.01
Groundman	\$ 17.50

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:

Journeyman

\$ 5.14

*plus 3% of
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

01/01/2022

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting

DISTRICT 6

ENTIRE COUNTIES

Westchester

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/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 #14.01.03)

Per hour:	07/01/2021	05/02/2022	05/01/2023	05/06/2024
Lineman, Technician	\$ 52.56	\$ 53.60	\$ 54.73	\$ 55.95
Crane, Crawler Backhoe	52.56	53.60	54.73	55.95
Certified Welder	55.19	56.28	57.47	58.75
Digging Machine	47.30	48.24	49.26	50.36
Tractor Trailer Driver	44.68	45.56	46.52	47.56
Groundman, Truck Driver	42.05	42.88	43.78	44.76
Equipment Mechanic	42.05	42.88	43.78	44.76
Flagman	31.54	32.16	32.84	33.57

Above rates are applicable for installation, testing, operation, maintenance and repair on all Traffic Control (Signal) and Illumination (Lighting) projects, Traffic Monitoring Systems, and Road Weather Information Systems. Includes digging of holes for poles, anchors, footer foundations for electrical equipment; assembly of all electrical materials or raceway; placing of fish wire; pulling of cables, wires or fiber optic cable through such raceways; splicing of conductors; dismantling of such structures, lines or equipment.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM TO 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM REGULAR RATE PLUS 31.4%

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Tuesday thru Friday may be worked with no make-up day.
NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

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

	\$25.40 *plus 7% of hourly Wage	\$ 25.90 *plus 7% of hourly wage	\$ 26.40 *plus 7% of hourly wage	\$ 26.90 *plus 7% of hourly wage
Journeyman Lineman or Equipment Operators with Crane License	\$ 26.40 *plus 7% of hourly wage	\$ 27.90 *plus 7% of hourly wage	\$ 29.40 *plus 7% of hourly wage	\$ 30.90 *plus 7% of hourly wage

*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 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:

07/01/2021	05/02/2022	05/01/2023	05/06/2024
\$25.40 *plus 7% of hourly Wage	\$ 25.90 *plus 7% of hourly wage	\$ 26.40 *plus 7% of hourly wage	\$ 26.90 *plus 7% of hourly wage

*The 7% is based on the hourly wage paid, straight time or premium time.

6-1249aWestLT

Mason - Building 01/01/2022

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2021	12/06/2021	06/06/2022 Additional \$ 0.72
Tile Setters	\$ 61.07	\$ 61.44	

SUPPLEMENTAL BENEFITS

Per Hour:	\$ 24.91* + \$10.01	\$ 25.01* + \$10.02
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* 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:

Tile Setters:

(750 hour) term at the following wage rate:

Term:	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	1-	751-	1501-	2251-	3001-	3751-	4501-	5251-	6001-	6501-
	750	1500	2250	3000	3750	4500	5250	6000	6750	7000
07/01/2021	\$20.84	\$25.66	\$32.68	\$37.50	\$40.99	\$44.30	\$47.82	\$52.63	\$55.35	\$59.34

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$12.55*	\$12.55*	\$15.16*	\$15.16*	\$16.16*	\$17.66*	\$18.66*	\$18.66*	\$16.66*	\$21.91*
+\$.66	+\$.71	+\$.81	+\$.85	+\$ 1.23	+\$ 1.28	+\$ 1.63	+\$ 1.68	+\$ 5.83	+\$ 6.32

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

9-7/52A

Mason - Building

01/01/2022

JOB DESCRIPTION Mason - Building

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:

	07/01/2021	06/01/2022 Additional	06/01/2023 Additional
Bricklayer	\$ 43.35	\$ 2.39	\$ 2.05
Cement Mason	43.35	2.39	2.05
Plasterer/Stone Mason	43.35	2.39	2.05
Pointer/Caulker	43.35	2.39	2.05

Additional \$1.00 per hour for power saw work

Additional \$0.50 per hour for swing scaffold or staging work

SHIFT WORK: When shift work or an irregular work day is mandated or required by state, federal, county, local or other governmental agency contracts, the following premiums apply:

Irregular work day requires 15% premium

Second shift an additional 15% of wage plus benefits to be paid

Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 36.05.

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

01/01/2022

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

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

WAGES

Building

07/01/2021 01/01/2022

Wages per hour:

Mosaic & Terrazzo Mechanic \$ 58.46 \$ 59.21

Mosaic & Terrazzo Finisher \$ 56.86 \$ 57.60

SUPPLEMENTAL BENEFITS

Per hour:

Mosaic & Terrazzo Mechanic \$ 26.11* \$ 26.21*
+ \$11.73 + \$11.73

Mosaic & Terrazzo Finisher \$ 26.11* \$ 26.21*
+ \$11.71 + \$11.72

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

OVERTIME PAY

See (A, E, Q) on OVERTIME PAGE

07/01/2021-Deduct \$6.80 from hourly wages before calculating overtime.

01/01/2022- Deduct \$7.00 from hourly wages before calculating overtime.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
Easter Sunday is an observed holiday. Holidays falling on a Saturday will be observed on that Saturday. Holidays falling on a Sunday will be celebrated on the Monday.

REGISTERED APPRENTICES

Wages per hour:

(750 Hour) terms at the following wage rate.

	1st	2nd	3rd	4th	5th	6th	7th	8th
07/01/2021	\$ 25.82	\$ 28.40	\$ 31.00	\$ 33.58	\$ 36.16	\$ 38.74	\$ 43.91	\$ 49.08
01/01/2022	\$ 26.09	\$ 28.71	\$ 31.32	\$ 33.94	\$ 36.55	\$ 39.15	\$ 44.38	\$ 49.60

Supplemental benefits per hour:

07/01/2021 \$13.06* \$14.37* \$15.67* \$16.98* \$18.28* \$19.59* \$22.20* \$24.81*
+\$9.27 +\$10.19 +\$11.12 +\$12.04 +\$12.97 +\$13.90 +\$15.75 +\$17.60

01/01/2022 \$13.11* \$14.42* \$15.73* \$17.04* \$18.35* \$19.66* \$22.28* \$24.90*
+\$9.37 +\$10.30 +\$11.24 +\$12.17 +\$13.11 +\$14.05 +\$15.92 +\$17.79

Apprentices hired after 07/01/2017:
Wages Per hour:

	1st 0- 1500	2nd 1501- 3000	3rd 3001- 3750	4th 3751- 4500	5th 4501- 5250	6th 5251- 6000
07/01/2021	\$ 22.63	\$ 29.10	\$ 31.00	\$ 36.16	\$ 41.32	\$ 46.48
01/01/2022	\$ 22.82	\$ 29.34	\$ 31.32	\$ 36.55	\$ 41.77	\$ 46.99

Supplemental Benefits per hour:

	1st	2nd	3rd	4th	5th	6th
07/01/2021	\$4.59*	\$5.90*	\$15.67*	\$18.28*	\$20.89*	\$23.50*
	+\$6.49	+\$8.34	+\$11.12	+\$12.97	+\$14.83	+\$16.67
01/01/2022	\$4.62*	\$5.94*	\$15.73*	\$18.35*	\$20.97*	\$23.59*
	+\$6.56	+\$8.43	+\$11.24	+\$13.11	+\$14.99	+\$16.85

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

9-7/3

Mason - Building

01/01/2022

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

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

WAGES

Per hour: 07/01/2021 01/01/2022

Building-Marble Restoration:
Marble, Stone & \$ 46.16 \$ 46.60
Terrazzo Polisher, etc

SUPPLEMENTAL BENEFITS

Per Hour:
Journeyworker:

Building-Marble Restoration:
Marble, Stone & \$ 29.11 \$ 29.77
Polisher

OVERTIME PAY

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

*ON SATURDAYS, 8TH HOUR AND SUCCESSIVE HOURS PAID AT DOUBLE HOURLY RATE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE
1ST TERM APPRENTICE GETS PAID FOR ALL OBSERVED HOLIDAYS.

REGISTERED APPRENTICES

WAGES per hour:

900 hour term at the following wage:

	1st 1- 900	2nd 901- 1800	3rd 1801- 2700	4th 2701
07/01/2021	\$32.28	\$36.91	\$41.51	\$46.16
01/01/2022	\$32.61	\$37.28	\$41.94	\$46.60

Supplemental Benefits Per Hour:

07/01/2021	\$26.47	\$27.34	\$28.29	\$29.11
01/01/2022	\$27.07	\$27.97	\$28.87	\$29.77

9-7/24-MP

Mason - Building	01/01/2022
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JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

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

WAGES

Wages:	07/01/2021	01/03/2022
Marble Cutters & Setters	\$ 61.73	\$ 62.17

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker	\$ 37.76	\$ 38.27
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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:

750 hour terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6751	6751-7500
07/01/2021									
\$ 24.70	\$ 27.77	\$ 30.87	\$ 33.94	\$ 37.03	\$ 40.11	\$ 43.20	\$ 46.29	\$ 52.46	\$ 58.64
01/03/2022									
\$ 24.88	\$ 27.97	\$ 31.08	\$ 34.17	\$ 37.29	\$ 40.39	\$ 43.51	\$ 46.61	\$ 52.82	\$ 59.05

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
07/01/2021									
\$ 20.01	\$ 21.43	\$ 22.83	\$ 24.25	\$ 25.65	\$ 27.07	\$ 28.47	\$ 29.88	\$ 32.70	\$ 35.51
01/03/2022									
\$ 20.55	\$ 22.04	\$ 23.52	\$ 25.01	\$ 26.47	\$ 27.96	\$ 29.42	\$ 30.91	\$ 33.86	\$ 36.81

9-7/4

Mason - Building	01/01/2022
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JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Nassau, Rockland, Suffolk, Westchester

WAGES

Per hour:	07/01/2021	12/06/2021	06/06/2022
Tile Finisher	\$ 46.89	\$ 47.18	Additional \$ 0.58

SUPPLEMENTAL BENEFITS

Per Hour:

\$ 21.91*	\$ 22.01*
+ \$9.84	+ \$9.84

*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

01/01/2022

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

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

WAGES

Per hour: 07/01/2021 01/01/2022

Marble, Stone, etc.

Maintenance Finishers: \$ 26.73 \$ 27.01

Note 1: An additional \$2.00 per hour
for time spent grinding floor using
"60 grit" and below.

Note 2: Flaming equipment operator
shall be paid an additional \$25.00 per day.

SUPPLEMENTAL BENEFITS

Per Hour:

Marble, Stone, etc

Maintenance Finishers: \$ 14.00 \$ 14.40

OVERTIME PAY

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

*Double hourly rate after 8 hours on Saturday

HOLIDAY

Paid: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

1st term apprentice gets paid for all observed holidays.

REGISTERED APPRENTICES

WAGES per hour:

07/01/2021 01/01/2022

0-750 \$21.37 \$21.67

751-1500 \$22.09 \$22.38

1501-2250 \$22.81 \$23.10

2251-3000 \$23.52 \$23.80

3001-3750 \$24.61 \$24.87

3751-4500 \$26.04 \$26.29

4501+ \$26.73 \$27.01

Supplemental Benefits:

Per hour:

0-750 \$ 11.24 \$11.52

751-1500 \$ 11.60 \$11.90

1501-2250 \$ 11.97 \$12.29

2251-3000 \$ 12.35 \$12.67

3001-3750 \$ 12.84 \$13.25

3751-4500 \$ 13.63 \$14.01

4501+ \$ 14.00 \$14.40

9-7/24M-MF

Mason - Building / Heavy&Highway

01/01/2022

JOB DESCRIPTION Mason - Building / Heavy&Highway

DISTRICT 9

ENTIRE COUNTIES

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

WAGES

Per hour:	07/01/2021	01/03/2022
Marble-Finisher	\$ 48.87	\$ 48.97

SUPPLEMENTAL BENEFITS

Journeyworker:
per hour

Marble- Finisher	\$ 35.25	\$ 35.76
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OVERTIME PAY

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

HOLIDAY

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

* Work beyond 8 hours on a Saturday shall be paid at double the rate.

** When an observed holiday falls on a Sunday, it will be observed the next day.

9-7/20-MF

Mason - Heavy&Highway

01/01/2022

JOB DESCRIPTION Mason - Heavy&Highway

DISTRICT 11

ENTIRE COUNTIES

Putnam, Rockland, Westchester

PARTIAL COUNTIES

Orange: Only the Township of Tuxedo.

WAGES

Per hour:	07/01/2021	06/01/2022	06/01/2023
		Additional	Additional
Bricklayer	\$ 43.85	\$ 2.39	\$ 2.05
Cement Mason	43.85	2.39	2.05
Marble/Stone Mason	43.85	2.39	2.05
Plasterer	43.85	2.39	2.05
Pointer/Caulker	43.85	2.39	2.05

Additional \$1.00 per hour for power saw work

Additional \$0.50 per hour for swing scaffold or staging work

SHIFT WORK: When shift work or an irregular work day is mandated or required by state, federal, county, local or other governmental contracts, the following rates apply:

Irregular work day requires 15% premium

Second shift an additional 15% of wage plus benefits to be paid

Third shift an additional 25% of wage plus benefits to be paid

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 36.05
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OVERTIME PAY

Cement Mason See (B, E, Q, W, X)

All Others See (B, E, Q, X)

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.

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**01/01/2022**

JOB DESCRIPTION Operating Engineer - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Putnam, Queens, Richmond, Westchester

PARTIAL COUNTIES

Dutchess: that part of Dutchess County lying south of the North City Line of the City of Poughkeepsie.

WAGES

NOTE: Construction surveying

Party Chief--One who directs a survey party

Instrument Man--One who runs the instrument and assists Party Chief.

Rodman--One who holds the rod and assists the Survey Crew

Wages:(Per Hour) 07/01/2021

Building Construction:

Party Chief	\$ 76.09
Instrument Man	\$ 60.41
Rodman	\$ 41.11

Steel Erection:

Party Chief	\$ 79.02
Instrument Man	\$ 62.89
Rodman	\$ 44.03

Heavy Construction-NYC counties only:
(Foundation, Excavation.)

Party Chief	\$ 84.60
Instrument man	\$ 63.79
Rodman	\$ 54.52

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

Building Construction \$ 24.40* +\$ 7.15

Steel Erection \$ 25.00* +\$ 7.15

Heavy Construction \$ 25.25* +\$ 7.15

* This portion subject to same premium as wages

Non-Worked Holiday Supplemental Benefit:

\$ 16.45

OVERTIME PAY

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

Code "A" applies to Building Construction and has double the rate after 7 hours on Saturdays.

Code "B" applies to Heavy Construction and Steel Erection and had double the rate after 8 hours on Saturdays.

HOLIDAY

Paid: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE

9-15Db

Operating Engineer - Building**01/01/2022**

JOB DESCRIPTION Operating Engineer - Building

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

PARTIAL COUNTIES

Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES

GROUP I:

Cranes (All Types up to 49 tons), Boom Trucks, Cherry Pickers (All Types), Clamshell Crane, Derrick (Stone and Steel), Dragline, Franki Pile Rig or similar, High Lift (Lull or similar) with crane attachment and winch used for hoisting or lifting, Hydraulic Cranes, Pile Drivers, Potain and similar.

Cranes (All types 50-99 tons), Drill Rig Casa Grande (CAT or similar), Franki Pile Rig or similar, Hydraulic Cranes (All types including Crawler Cranes- No specific boom length).

Cranes (All types 100 tons and over), All Tower Cranes, All Climbing Cranes irrespective of manufacturer and regardless of how the same is rigged, Franki Pile Rig or similar, Conventional Cranes (All types including Crawler Cranes-No specific boom length), Hydraulic Cranes.

GROUP I-A: Barber Green Loader-Euclid Loader, Bulldozer, Carrier-Trailer Horse, Concrete Cleaning Decontamination Machine Operator, Concrete-Portable Hoist, Conway or Similar Mucking Machines, Elevator & Cage, Excavators all types, Front End Loaders, Gradall, Shovel, Backhoe, etc.(Crawler or Truck), Heavy Equipment Robotics Operator/Mechanic, Hoist Engineer-Material, Hoist Portable Mobile Unit, Hoist(Single, Double or Triple Drum), Horizontal Directional Drill Locator, Horizontal Directional Drill Operator and Jersey Spreader, Letourneau or Tournapull(Scrapers over 20 yards Struck), Lift Slab Console, etc., Lull HiLift or Similar, Master Environmental Maintenance Mechanics, Mucking Machines Operator/Mechanic or Similar Type, Overhead Crane, Pavement Breaker(Air Ram), Paver(Concrete), Post Hole Digger, Power House Plant, Road Boring Machine, Road Mix Machine, Ross Carrier and Similar Machines, Rubber tire double end backhoes and similar machines, Scoopmobile Tractor-Shovel Over 1.5 yards, Shovel (Tunnels), Spreader (Asphalt) Telephie(Cableway), Tractor Type Demolition Equipment, Trenching Machines-Vermeer Concrete Saw Trencher and Similar, Ultra High Pressure Waterjet Cutting Tool System, Vacuum Blasting Machine operator/mechanic, Winch Truck A Frame.

GROUP I-B: Compressor (Steel Erection), Mechanic (Outside All Types), Negative Air Machine (Asbestos Removal), Push Button (Buzz Box) Elevator.

GROUP II: Compactor Self-Propelled, Concrete Pump, Crane Operator in Training (Over 100 Tons), Grader, Machines Pulling Sheep's Foot Roller, Roller (4 ton and over), Scrapers (20 yards Struck and Under), Vibratory Rollers, Welder.

GROUP III-A: Asphalt Plant, Concrete Mixing Plants, Forklift (All power sources), Joy Drill or similar, Tractor Drilling Machine, Loader (1 1/2 yards and under), Portable Asphalt Plant, Portable Batch Plant, Portable Crusher, Skid Steer (Bobcat or similar), Stone Crusher, Well Drilling Machine, Well Point System.

GROUP III-B: Compressor Over 125 cu.Feet, Conveyor Belt Machine regardless of size, Compressor Plant, Ladder Hoist, Stud Machine.

GROUP IV-A: Batch Plant, Concrete Breaker, Concrete Spreader, Curb Cutter Machine, Finishing Machine-Concrete, Fine Grading Machine, Hepa Vac Clean Air Machine, Material Hopper(sand, stone, cement), Mulching Grass Spreader, Pump Gypsum etc, Pump-Plaster-Grout-Fireproofing. Roller(Under 4 Ton),Spreading and Fine Grading Machine, Steel Cutting Machine, Siphon Pump, Tar Joint Machine, Television Cameras for Water, Sewer, Gas etc. Turbo Jet Burner or Similar Equipment, Vibrator (1 to 5).

GROUP IV-B: Compressor (all types), Heater (All Types), Fire Watchman, Lighting Unit (Portable & Generator) Pump, Pump Station(Water, Sewer, Portable, Temporary), Welding Machine (Steel Erection & Excavation).

GROUP V: Mechanics Helper, Motorized Roller (walk behind), Stock Attendant, Welder's Helper, Maintenance Engineer Crane(75 ton and over).

Group VI-A: Welder Certified

GROUP VI-B: Utility Man, Warehouse Man.

WAGES: (per hour)

	07/01/2021	3/7/2022	3/6/2023
GROUP I			
Cranes- up to 49 tons	\$ 63.86	\$ 65.03	\$ 66.23
Cranes- 50 tons to 99 tons	66.07	67.28	68.53
Cranes- 100 tons and over	75.37	76.77	78.21
GROUP I-A	55.96	56.97	58.01
GROUP I-B	51.60	52.52	53.48

GROUP II	54.00	54.98	55.70
GROUP III-A	52.04	52.97	53.94
GROUP III-B	49.56	50.44	51.35
GROUP IV-A	51.52	52.44	53.40
GROUP IV-B	43.62	44.38	45.17
GROUP V	47.00	47.83	48.69
Group VI-A	54.94	55.93	56.96
GROUP VI-B			
Utility Man	44.61	45.39	46.21
Warehouse Man	46.74	47.57	48.42

An additional 20% to wage when required to wear protective equipment on hazardous/toxic waste projects.
Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional \$2.00 per hour.
Engineers operating cranes with booms 149 feet or over in length will be paid an additional \$3.00 per hour.
Loader operators over 5 cubic yard capacity additional .50 per hour.
Shovel operators over 4 cubic yard capacity additional \$1.00 per hour.

SUPPLEMENTAL BENEFITS

Per hour:

	07/01/2021	03/07/2022	03/06/2023
Journeyworker	\$ 29.17	\$ 29.87	\$ 30.57

OVERTIME PAY

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

HOLIDAY

Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

8-137B

Operating Engineer - Heavy&Highway

01/01/2022

JOB DESCRIPTION Operating Engineer - Heavy&Highway

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

PARTIAL COUNTIES

Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES

GROUP I: Boom Truck, Cherry Picker, Clamshell, Crane, (Crawler, Truck),
Dragline, Drill Rig (Casa Grande, Cat, or Similar), Floating Crane (Crane on Barges) under 100 tons, Gin Pole, Hoist Engineer-Concrete (Crane-Derrick-Mine Hoist), Knuckle Boom Crane, Rough Terrain Crane.

GROUP I-A: Auger (Truck or Truck Mounted), Boat Captain, Bulldozer-All Sizes, Central Mix Plant Operator, Chipper (all types), Close Circuit T.V., Combination Loader/Backhoe, Compactor with Blade, Concrete Finishing Machine, Gradall, Grader (Motor Grader), Elevator & Cage (Materials or Passenger), Excavator (and all attachments), Front End Loaders (1 1/2 yards and over), High Lift Lull and similar, Hoist (Single, Double, Triple Drum), Hoist Portable Mobile Unit, Hoist Engineer (Material), Jack and Bore Machine, Log Skidders, Mill Machines, Mucking Machines, Overhead Crane, Paver (concrete), Post Pounder (of any type), Push Cats, Road Reclaimer, Robot Hammer (Brokk or similar), Robotic Equipment (Scope of Engineer Schedule), Ross Carrier and similar, Scrapers (20 yard struck and over), Side Boom, Slip Form Machine, Spreader (Asphalt), Trenching Machines (Telephies-Vermeer Concrete Saw), Tractor Type Demolition Equipment, Vacuum Truck. Vibratory Roller(Riding) or Roller used in mainline paving operations.

GROUP I-B: Asphalt Mobile Conveyor/Transfer Machine, Road Paver (Asphalt).

GROUP II-A: Ballast Regulators, Compactor Self Propelled, Fusion Machine, Rail Anchor Machines, Roller (4 ton and over), Scrapers (20 yard struck and under).

GROUP II-B: Mechanic (Outside) All Types, Shop Mechanic.

GROUP III: Air Tractor Drill, Asphalt Plant, Batch Plant, Boiler (High Pressure), Concrete Breaker (Track or Rubber Tire), Concrete Pump, Concrete Spreader, Excavator Drill, Farm Tractor, Forklift (all types), Gas Tapping (Live), Hydroseeder, Loader (1 1/2 yards and under), Locomotive (all sizes), Machine Pulling Sheeps Foot Roller, Portable Asphalt Plant, Portable Batch Plant, Portable Crusher (Apprentice), Powerhouse Plant, Roller (under 4 ton), Sheer Excavator, Skid Steer/Bobcat, Stone Crusher, Sweeper (with seat), Well Drilling Machine.

GROUP IV: Service Person (Grease Truck), Deckhand.

GROUP IV-B: Conveyor Belt Machine (Truck Mounted), Heater (all types), Lighting Unit (Portable), Maintenance Engineer (For Crane Only), Mechanics Helper, Pump (Fireproofing), Pumps-Pump Station/Water/Sewer/Gypsum/Plaster, etc., Pump Truck (Sewer Jet or Similar), Welders Helper, Welding Machine (Steel Erection), Well Point System.

GROUP V: All Tower Cranes-All Climbing Cranes and all cranes of 100-ton capacity or greater (3900 Manitowac or similar) irrespective of manufacturer and regardless of how the same is rigged, Hoist Engineer (Steel), Engineer-Pile Driver, Jersey Spreader, Pavement Breaker/Post Hole Digger.

WAGES: Per hour:	07/01/2021	03/07/2022	03/06/2023
Group I	\$ 64.63	\$ 65.97	\$ 67.27
Group I-A	57.02	58.16	59.26
Group I-B	60.06	61.28	62.46
Group II-A	54.61	55.70	56.74
Group II-B	56.31	57.44	58.52
Group III	53.66	54.72	55.74
Group IV	48.80	49.74	50.63
Group IV-B	41.94	42.71	43.43
Group V			
Engineer All Tower, Climbing and			
Cranes of 100 Tons	73.18	74.73	76.24
Hoist Engineer(Steel)	66.29	67.67	69.01
Engineer(Pile Driver)	70.67	72.16	73.61
Jersey Spreader,Pavement Breaker (Air			
Ram)Post Hole Digger	55.87	56.99	58.06

SHIFT DIFFERENTIAL:

A 15% premium on all hours paid, including overtime hours for 2nd, 3rd shifts
on all government mandated off-shift work

Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional \$2.00 per hour over the rate listed in the Wage Schedule. Engineers operating cranes with booms 149 feet or over in length will be paid an additional \$3.00 per hour over the rate listed in the Wage Schedule. Loader and Excavator Operators: over 5 cubic yards capacity \$0.50 per hour over the rate listed in the Wage Schedule. Shovel Operators: over 4 cubic yards capacity \$1.00 per hour over the rate listed in the Wage Schedule.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday; Friday may be used as a make-up day.

NOTE - In order to use the 4 Day/10 Hour Work schedule Registration for Use of 4 Day/10 Hour Work Schedule, form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:	07/01/2021	03/07/2022	03/06/2023
	\$ 31.60 up	\$ 32.60 up	\$ 33.75 up
	to 40 Hours	to 40 hours	to 40 hours
	After 40 hours	After 40 hours	After 40 hours
	\$ 22.40* PLUS	\$ 23.40* PLUS	\$ 24.50* PLUS
	\$ 1.20 on all	\$ 1.20 on all	\$ 1.25 on all
	hours worked	hours worked	hours worked

*This amount is subject to premium

OVERTIME PAY

See (B, E, E2, P, *R, **U) on OVERTIME PAGE

HOLIDAY

Paid:..... See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

Overtime..... See (5, 6, 8, 15, 25, 26) on OVERTIME PAGE

* For Holiday codes 8,15,25,26 code R applies

** For Holiday Codes 5 & 6 code U applies

Note: If employees are required to work on Easter Sunday they shall be paid at the rate of triple time.

REGISTERED APPRENTICES

(1)year terms at the following rate.

07/01/2021	03/07/2022	03/06/2023
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1st term	\$ 28.51	\$ 29.08	\$ 29.63
2nd term	34.21	34.90	35.56
3rd term	39.91	40.71	41.48
4th term	45.61	46.53	47.41
Supplemental Benefits per hour:			
	23.60	24.55	25.70

8-137HH

Operating Engineer - Heavy&Highway

01/01/2022

JOB DESCRIPTION Operating Engineer - Heavy&Highway

DISTRICT 9

ENTIRE COUNTIES

Putnam, Westchester

PARTIAL COUNTIES

Dutchess: South of the North city line of Poughkeepsie

WAGES

Party Chief - One who directs a survey party

Instrument Man - One who runs the instrument and assists Party Chief

Rodman - One who holds the rod and in general, assists the Survey Crew

Categories cover GPS & Underground Surveying

Per Hour: 07/01/2021

Party Chief \$ 81.72

Instrument Man 61.43

Rodman 52.40

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

All Categories

Straight Time: \$ 25.25* plus \$7.15

Premium:

Time & 1/2 \$ 37.88* plus \$7.15

Double Time \$ 50.50* plus \$7.15

Non-Worked Holiday Supplemental Benefits:

\$ 16.45

OVERTIME PAY

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

* Doubletime paid on all hours in excess of 8 hours on Saturday

HOLIDAY

Paid: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

Overtime: See (5, 6, 7, 11, 12) on HOLIDAY PAGE

9-15Dh

Operating Engineer - Heavy&Highway - Tunnel

01/01/2022

JOB DESCRIPTION Operating Engineer - Heavy&Highway - Tunnel

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

PARTIAL COUNTIES

Dutchess: All the counties of Westchester and Putnam and the southern part of Dutchess County defined by the northern boundary line of the City of Poughkeepsie, then due east to Route 115, then north along Route 115 to Bedell Road, then east along Bedell Road to Van Wagner Road, then north along Van Wagner Road to Bower Road, then east along Bower Road to Route 44 and along Route 44 east to Route 343, then along Route 343 east to the northern boundary of Town of Dover Plains and east along the northern boundary of Town of Dover Plains to the border line of the State of Connecticut and bordered on the west by the middle of the Hudson River.

WAGES

GROUP I: Boom Truck, Cherry Picker, Clamshell, Crane(Crawler,Truck), Dragline, Drill Rig Casa Grande(Cat or Similar), Floating Crane(Crane on Barge-Under 100 Tons), Hoist Engineer(Concrete/Crane-Derrick-Mine Hoist), Knuckle Boom Crane, Rough Terrain Crane.

GROUP I-A: Auger(Truck or Truck Mounted), Boat Captain, Bull Dozer-all sizes, Central Mix Plant Operator, Chipper-all types, Close Circuit T.V., Combination Loader/Backhoe, Compactor with Blade, Concrete Finishing Machine, Gradall, Grader(Motor Grader), Elevator & Cage(Materials or Passengers), Excavator(and all attachments), Front End Loaders(1 1/2 yards and over), High Lift Lull, Hoist(Single, Double, Triple Drum), Hoist Portable Mobile Unit, Hoist Engineer(Material), Jack and Bore Machine, Log Skidder, Milling Machine, Moveable Concrete Barrier Transfer & Transport Vehicle, Mucking Machines. Overhead Crane, Paver(Concrete), Post Pounder of any type, Push Cats, Road Reclaimer, Robot Hammer(Brokk or similar), Robotic Equipment(Scope of Engineer Schedule), Ross Carrier and similar machines, Scrapers(20 yards struck and over), Side Boom, Slip Form Machine, Spreader(Asphalt), Trenching Machines, Telephies-Vermeer Concrete Saw, Tractor type demolition equipment, Vacuum Truck, Vibratory Roller (Riding) used in mainline paving operations.

GROUP I-B: Asphalt Mobile Conveyor/Transfer Machine, Road Paver(Asphalt).

GROUP II-A: Ballast Regulators, Compactor(Self-propelled), Fusion Machine, Rail Anchor Machines, Roller(4 ton and over), Scrapers(20 yard struck and under).

GROUP II-B: Mechanic(outside)all types, Shop Mechanic.

GROUP III: Air Tractor Drill, Asphalt Plant, Batch Plant, Boiler(High Pressure), Concrete Breaker(Track or Rubber Tire), Concrete Pump, Concrete Spreader, Excavator Drill, Farm Tractor, Forklift(all types of power), Gas Tapping(Live), Hydroseeder, Loader(1 1/2 yards and under), Locomotive(all sizes), Machine Pulling Sheeps Foot Roller, Portable Asphalt Plant, Portable Batch Plant, Portable Crusher(Apprentice), Powerhouse Plant, Roller(under 4 ton), Sheer Excavator, Skidsteer/Bobcat, Stone Crusher, Sweeper(with seat), Well Drilling Machine.

GROUP IV-A: Service Person(Grease Truck), Deckhand.

GROUP IV-B: Conveyor Belt Machine(Truck Mounted), Heater(all types), Lighting Unit(Portable), Maintenance Engineer(for Crane only), Mechanics Helper, Pump(Fireproofing), Pumps-Pump Station/Water/Sewer/Gypsum/Plaster, etc., Pump Truck(Sewer Jet or similar), Welding Machine(Steel Erection), Welders Helper.

GROUP V-A: Engineer(all Tower Cranes, all Climbing Cranes & all Cranes of 100 ton capacity or greater),Hoist Engineer(Steel-Sub Structure), Engineer-Pile Driver, Jersey-Spreader, Pavement breaker, Post Hole Digger

WAGES: (per hour)

	07/01/2021	03/07/2022	03/06/2023
GROUP I	\$ 64.63	\$ 65.97	\$ 67.27
GROUP I-A	57.02	58.16	59.21
GROUP I-B	60.06	61.28	62.46
GROUP II-A	54.61	55.70	56.74
GROUP II-B	56.31	57.44	58.52
GROUP III	53.66	54.72	55.74
GROUP IV-A	48.80	49.74	50.63
GROUP IV-B	41.94	42.71	43.43
GROUP V-A			
Engineer-Cranes	73.18	74.73	76.24
Engineer-Pile Driver	70.67	72.16	73.61
Hoist Engineer	66.29	67.67	69.01
Jersey Spreader/Post Hole Digger	55.87	56.99	58.06

SHIFT DIFFERENTIAL:

A 15% premium on all hours paid, including overtime hours for 2nd, 3rd shifts on all government mandated off-shift work

An additional 20% to wage when required to wear protective equipment on hazardous/toxic waste projects. Operators required to use two buckets pouring concrete on other than road pavement shall receive \$0.50 per hour over scale. Engineers operating cranes with booms 100 feet but less than 149 feet in length will be paid an additional \$2.00 per hour. Engineers operating cranes with booms 149 feet or over in length will be paid an additional \$3.00 per hour. Operators of shovels with a capacity over (4) cubic yards shall be paid an additional \$1.00 per hour. Operators of loaders with a capacity over (5) cubic yards shall be paid an additional \$0.50 per hour.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:

	07/01/2021	03/07/2022	03/06/2023
	\$ 23.60	\$ 24.55	\$ 25.70
	+ \$8.00	+ \$8.00	+ \$8.00

(Limited to
first 40 hours)

(Limited to
first 40 hours)

(Limited to
first 40 hours)

OVERTIME PAY

See (D, O, *U, V) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 15, 25, 26) on HOLIDAY PAGE

* Note: For Holiday codes 5 & 6, code U applies. For Holiday codes 8, 15, 25, 26, code R applies.

Note: If employees are required to work on Easter Sunday, they shall be paid at the rate of triple time.

REGISTERED APPRENTICES

(1)year terms at the following rates:

	07/01/2021	03/07/2022	03/06/2023
1st term	\$ 28.51	\$ 29.08	\$ 29.63
2nd term	34.21	34.90	35.56
3rd term	39.91	40.71	41.48
4th term	45.61	46.53	47.41

Supplemental Benefits per hour:

All terms	\$ 23.60	\$ 24.55	\$ 25.70
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8-137Tun

Operating Engineer - Marine Dredging

01/01/2022

JOB DESCRIPTION Operating Engineer - Marine Dredging

DISTRICT 4

ENTIRE COUNTIES

Albany, Bronx, Cayuga, Clinton, Columbia, Dutchess, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Orange, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

WAGES

These wages do not apply to Operating Engineers on land based construction projects. For those projects, please see the Operating Engineer Heavy/Highway Rates. The wage rates below for all equipment and operators are only for marine dredging work in navigable waters found in the counties listed above.

Per Hour:	07/01/2021	10/01/2021
CLASS A1 Deck Captain, Leverman Mechanical Dredge Operator Licensed Tug Operator 1000HP or more.	\$ 41.42	\$ 41.42
CLASS A2 Crane Operator (360 swing)	36.91	36.91
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	35.82	35.82
CLASS B2 Certified Welder	33.72	33.72
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	32.80	32.80
CLASS C2 Boat Operator	30.89	31.74

CLASS D	25.66	26.37
Shoreman, Deckhand, Oiler, Rodman, Scowman, Cook, Messman, Porter/Janitor		

SUPPLEMENTAL BENEFITS

Per Hour:

THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

All Classes A & B	07/01/2021 \$11.98 plus 8% of straight time wage, Overtime hours add \$ 0.63	10/01/2021 \$11.98 plus 8% of straight time wage, Overtime hours add \$ 0.63
All Class C	\$11.68 plus 8% of straight time wage, Overtime hours add \$ 0.48	11.68 plus 8% of straight time wage, Overtime hours add \$ 0.48
All Class D	\$11.38 plus 8% of straight time wage, Overtime hours add \$ 0.33	11.38 plus 8% of straight time wage, Overtime hours add \$ 0.33

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 - Survey Crew - Consulting Engineer

01/01/2022

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer

DISTRICT 9

ENTIRE COUNTIES

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

PARTIAL COUNTIES

Dutchess: That part in Dutchess County lying South of the North City line of Poughkeepsie.

WAGES

Feasibility and preliminary design surveying, any line and grade surveying for inspection or supervision of construction.

Per hour: 07/01/2021
Survey Classifications

Party Chief	\$ 45.83
Instrument Man	38.17
Rodman	33.34

SUPPLEMENTAL BENEFITS

Per Hour:

All Crew Members: \$ 20.60

OVERTIME PAY

OVERTIME:.... See (B, E*, Q, V) ON OVERTIME PAGE.

*Doubletime paid on the 9th hour on Saturday.

HOLIDAY

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

9-15dconsult

Painter

01/01/2022

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

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

WAGES

Per hour: 07/01/2021

Brush \$ 50.30*

Abatement/Removal of lead based
or lead containing paint on
materials to be repainted. 50.30*

Spray & Scaffold \$ 53.30*
Fire Escape 53.30*
Decorator 53.30*
Paperhanger/Wall Coverer 52.93*

*Subtract \$ 0.10 to calculate premium rate.

SUPPLEMENTAL BENEFITS

Per hour: 07/01/2021

Paperhanger \$ 31.83
All others 29.81
Premium 33.40**

**Applies only to "All others" category, not paperhanger journeyworker.

OVERTIME PAY

See (A, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One (1) year terms at the following wage rate.

Per hour: 07/01/2021
Appr 1st term... \$ 19.56*
Appr 2nd term... 25.12*
Appr 3rd term... 30.42*
Appr 4th term... 40.65*

*Subtract \$ 0.10 to calculate premium rate.

Supplemental benefits:
Per Hour: 07/01/2021
Appr 1st term... \$ 14.72
Appr 2nd term... 18.23
Appr 3rd term... 21.06
Appr 4th term... 26.67

8-NYDC9-B/S

Painter

01/01/2022

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

Putnam, Suffolk, Westchester

PARTIAL COUNTIES

Nassau: All of Nassau except the areas described below: Atlantic Beach, Ceadhurst, East Rockaway, Gibson, Hewlett, Hewlett Bay, Hewlett Neck, Hewlett Park, Inwood, Lawrence, Lido Beach, Long Beach, parts of Lynbrook, parts of Oceanside, parts of Valley Stream, and Woodmere. Starting on the South side of Sunrise Hwy in Valley Stream running east to Windsor and Rockaway Ave., Rockville Centre is the boundary line up to Lawson Blvd. turn right going west all the above territory. Starting at Union Turnpike and Lakeville Rd. going north to Northern Blvd. the west side of Lakeville road to Northern blvd. At Northern blvd. going east the district north of Northern blvd. to Port Washington Blvd. West of Port Washington blvd. to St. Francis Hospital then north of first traffic light to Port Washington and Sands Point, Manor HAven, Harbour Acres.

WAGES

Per hour: 07/01/2021
Drywall Taper \$ 50.30*

*Subtract \$ 0.10 to calculate premium rate.

SUPPLEMENTAL BENEFITS

Per hour: 07/01/2021
Journeyman \$ 29.81

OVERTIME PAY

See (A, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages - Per Hour: 07/01/2021

1500 hour terms at the following wage rate:

1st term	\$ 19.56*
2nd term	25.12*
3rd term	30.42*
4th term	40.65*

*Subtract \$ 0.10 to calculate premium rate.

Supplemental Benefits - Per hour:

One year term (1500 hours) at the following dollar amount.

1st year	\$ 14.72
2nd year	18.23
3rd year	21.06
4th year	26.67

8-NYDCT9-DWT

Painter - Bridge & Structural Steel

01/01/2022

JOB DESCRIPTION Painter - Bridge & Structural Steel

DISTRICT 8

ENTIRE COUNTIES

Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES

Per Hour:

STEEL:

Bridge Painting:	07/01/2021	10/01/2021
	\$ 51.50	\$ 53.00
	+ 8.63*	+ 9.63*

ADDITIONAL \$6.00 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

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

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

NOTE: Generally, for Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

SHIFT WORK:

When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker:	07/01/2021	10/01/2021
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\$ 10.90	\$ 10.90
+ 30.00*	+ 30.60*

* 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

	07/01/2021	10/01/2021
1st year	\$ 20.60 + 3.45*	\$ 21.20 + 3.86*
2nd year	\$ 30.90 + 5.18*	\$ 31.80 + 5.78*
3rd year	\$ 41.20 + 6.90*	\$ 42.40 + 7.70*
Supplemental Benefits - Per hour:		
1st year	\$.25 + 12.00*	\$.25 + 12.24*
2nd year	\$ 10.90 + 18.00*	\$ 10.90 + 18.36*
3rd year	\$ 10.20 + 24.00*	\$ 10.90 + 24.48*

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

8-DC-9/806/155-BrSS

Painter - Line Striping

01/01/2022

JOB DESCRIPTION Painter - Line Striping

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:

Painter (Striping-Highway):	07/01/2021	07/01/2022
Striping-Machine Operator*	\$ 30.32	\$ 31.53
Linerman Thermoplastic	36.93	38.34

Note: * Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour paid:	07/01/2021	07/01/2022
Journeyworker:		
Striping Machine Operator:	\$ 10.03	\$ 10.03
Linerman Thermoplastic:	10.03	10.03

OVERTIME PAY

See (B, B2, E2, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 20) on HOLIDAY PAGE
Overtime: See (5, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES

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

	07/01/2021	12/31/2021	07/01/2022
1st Term*:	\$ 15.00	\$ 15.00	\$ 15.00
1st Term**:	14.00	15.00	15.00
1st Term***:	12.50	13.20	13.20
2nd Term:	18.19	18.19	18.92
3rd Term:	24.26	24.26	25.22

*Bronx, Kings, New York, Queens, Richmond, and Suffolk counties

**Nassau and Westchester counties

***All other counties

Supplemental Benefits per hour:

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

8-1456-LS

Painter - Metal Polisher

01/01/2022

JOB DESCRIPTION Painter - Metal Polisher

DISTRICT 8

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuylar, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2021
Metal Polisher	\$ 37.13
Metal Polisher*	38.23
Metal Polisher**	41.13

*Note: Applies on New Construction & complete renovation

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

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2021

Journeyworker:
All classification \$ 10.64

OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

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

	07/01/2021
1st year	\$ 16.00
2nd year	17.00

3rd year	18.00
1st year*	\$ 16.39
2nd year*	17.44
3rd year*	18.54
1st year**	\$ 18.50
2nd year**	19.50
3rd year**	20.50

*Note: Applies on New Construction & complete renovation

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

Supplemental benefits:

Per hour:

1st year	\$ 7.39
2nd year	7.39
3rd year	7.39

8-8A/28A-MP

Plumber

01/01/2022

JOB DESCRIPTION Plumber

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

Per hour:

07/01/2021

Plumber and

Steamfitter

\$ 59.01

SHIFT WORK:

When directly specified in public agency or authority contract documents, shift work outside the regular hours of work shall be comprised of eight (8) hours per shift not including Saturday, Sundays and holidays. One half (1/2) hour shall be allowed for lunch after the first four (4) hours of each shift. Wage and Fringes for shift work shall be straight time plus a shift premium of twenty-five (25%) percent. A minimum of five days Monday through Friday must be worked to establish shift work.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 39.26

OVERTIME PAY

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

OVERTIME:... See on OVERTIME PAGE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1)year terms at the following wages:

1st Term	\$ 21.89
2nd Term	25.13
3rd Term	29.01
4th Term	41.43
5th Term	44.45

Supplemental Benefits per hour:

1st term	\$ 16.25
2nd term	18.13
3rd term	21.57
4th term	28.41
5th term	30.11

8-21.1-ST

Plumber - HVAC / Service

01/01/2022

JOB DESCRIPTION Plumber - HVAC / Service

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Putnam, Westchester

PARTIAL COUNTIES

Delaware: Only the townships of Middletown and Roxbury

Ulster: Entire County(including Walkill and Shawangunk Prisons) except for remainder of Town of Shawangunk and Towns of Plattekill, Marlboro, and Wawarsing.

WAGES

Per hour: 07/01/2021

HVAC Service \$ 40.68
+ \$ 4.32*

*Note: This portion of wage is not subject to overtime premium.

SUPPLEMENTAL BENEFITS

Per hour: 07/01/2021

Journeyworker HVAC Service
\$ 26.54

OVERTIME PAY

See (B, F, R) on OVERTIME PAGE

HOLIDAY

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

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

REGISTERED APPRENTICES

HVAC SERVICE

(1)year terms at the following wages:

1st yr.	2nd yr.	3rd yr.	4th yr.	5th yr.
\$ 18.50	\$ 21.88	\$ 27.31	\$ 33.56	\$ 36.36
+\$2.37*	+\$2.67*	+\$3.22*	+\$3.84*	+\$4.07*

*Note: This portion of wage is not subject to overtime premium.

Supplemental Benefits per hour:

Apprentices 07/01/2021

1st term	\$ 19.66
2nd term	20.86
3rd term	22.21
4th term	24.02
5th term	25.33

8-21.1&2-SF/Re/AC

Plumber - Jobbing & Alterations

01/01/2022

JOB DESCRIPTION Plumber - Jobbing & Alterations

DISTRICT 8

ENTIRE COUNTIES

Dutchess, Putnam, Westchester

PARTIAL COUNTIES

Ulster: Entire county (including Walkill and Shawangunk Prisons in Town of Shawangunk) EXCEPT for remainder of Town of Shawangunk, and Towns of Plattekill, Marlboro, and Wawarsing.

WAGES

Per hour: 07/01/2021

Journeyworker: \$ 45.83

Repairs, replacements and alteration work is any repair or replacement of a present plumbing system that does not change existing roughing or water supply lines.

SHIFT WORK:

When directly specified in public agency or authority contract documents, shift work outside the regular hours of work shall be comprised of eight (8) hours per shift not including Saturday, Sundays and holidays. One half (1/2) hour shall be allowed for lunch after the first four (4) hours of each shift. Wage and Fringes for shift work shall be straight time plus a shift premium of twenty-five (25%) percent. A minimum of five days Monday through Friday must be worked to establish shift work.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker

\$ 32.96

OVERTIME PAY

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

*When used as a make-up day, hours after 8 on Saturday shall be paid at time and one half.

HOLIDAY

Paid:

See (1) on HOLIDAY PAGE

Overtime:

See (5, 6, 8, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following wages:

1st year	\$ 19.88
2nd year	22.06
3rd year	23.90
4th year	33.57
5th year	35.46

Supplemental Benefits per hour:

1st year	\$ 10.74
2nd year	12.65
3rd year	16.58
4th year	22.39
5th year	24.32

8-21.3-J&A

Roofer

01/01/2022

JOB DESCRIPTION Roofer

DISTRICT 9

ENTIRE COUNTIES

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

WAGES

Per Hour: 07/01/2021

Roofer/Waterproofer \$ 45.25
+ \$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: \$ 28.62

OVERTIME PAY

See (B, H) on OVERTIME PAGE

Note: An observed holiday that falls on a Sunday will be observed the following Monday.

HOLIDAY

Paid:

See (1) on HOLIDAY PAGE

Overtime:

See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year term

1st	2nd	3rd	4th
\$ 15.84	\$ 22.63	\$ 27.15	\$ 33.94
	+ 3.50*	+ 4.20*	+ 5.26*

Supplements:

1st	2nd	3rd	4th
\$ 3.72	\$ 14.47	\$ 17.30	\$ 21.55

9-8R

Sheetmetal Worker**01/01/2022****JOB DESCRIPTION** Sheetmetal Worker**DISTRICT 8****ENTIRE COUNTIES**

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

WAGES

	07/01/2021
SheetMetal Worker	\$ 44.15
	+ 3.37*

*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	\$ 44.20
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OVERTIME PAY

OVERTIME:.. See (B, E, Q,) on OVERTIME PAGE.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6, 8, 15, 16, 23) on HOLIDAY PAGE

REGISTERED APPRENTICES

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 16.36	\$ 18.41	\$ 20.46	\$ 22.51	\$ 24.54	\$ 26.60	\$ 29.12	\$ 31.65
+ 1.35*	+ 1.52*	+ 1.69*	+ 1.85*	+ 2.02*	+ 2.19*	+ 2.36*	+ 2.53*

*This portion is not subject to overtime premiums.

Supplemental Benefits per hour:

Apprentices	
1st term	\$ 18.96
2nd term	21.34
3rd term	23.71
4th term	26.11
5th term	28.46
6th term	30.82
7th term	32.72
8th term	34.64

8-38

Sheetmetal Worker**01/01/2022****JOB DESCRIPTION** Sheetmetal Worker**DISTRICT 4****ENTIRE COUNTIES**

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

WAGES

Per Hour:	07/01/2021	8/01/2021
Sign Erector	\$ 52.29	\$ 53.97

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

SUPPLEMENTAL BENEFITS

Per Hour:	07/01/2021	8/01/2021
Sign Erector	\$ 51.26	\$ 53.15

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:

07/01/2021

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 14.34	\$ 16.26	\$ 18.17	\$ 20.10	\$ 28.02	\$ 30.47	\$ 33.72	\$ 36.27	\$ 38.77	\$ 41.29

8/01/2021

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ TBD	\$ TBD	\$ TBD	\$ TBD	\$ TBD	\$ TBD	\$ TBD	\$ TBD	\$ TBD	\$ TBD

4-137-SE

Sprinkler Fitter

01/01/2022

JOB DESCRIPTION Sprinkler Fitter

DISTRICT 1

ENTIRE COUNTIES

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

WAGES

Per hour 07/01/2021

Sprinkler \$ 47.19
Fitter

SUPPLEMENTAL BENEFITS

Per hour

Journeyperson \$ 28.09

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
\$ 22.67	\$ 25.19	\$ 27.46	\$ 29.98	\$ 32.50	\$ 35.02	\$ 37.54	\$ 40.05	\$ 42.57	\$ 45.09

Supplemental Benefits per hour

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 8.27	\$ 8.27	\$ 19.22	\$ 19.22	\$ 19.47	\$ 19.47	\$ 19.47	\$ 19.47	\$ 19.47	\$ 19.47

1-669.2

Teamster - Building / Heavy&Highway

01/01/2022

JOB DESCRIPTION Teamster - Building / Heavy&Highway

DISTRICT 8

ENTIRE COUNTIES

Putnam, Westchester

WAGES

GROUP A: Straight Trucks (6-wheeler and 10-wheeler), A-frame, Winch, Dynamite Seeding, Mulching, Agitator, Water, Attenuator, Light Towers, Cement (all types), Suburban, Station Wagons, Cars, Pick Ups, any vehicle carrying materials of any kind.

GROUP AA: Tack Coat

GROUP B: Tractor & Trailers (all types).

GROUP BB: Tri-Axle, 14 Wheeler

GROUP C: Low Boy (carrying equipment).

GROUP D: Fuel Trucks, Tire Trucks.

GROUP E: Off-road Equipment (over 40 tons): Athey Wagons, Belly Dumps, Articulated Dumps, Trailer Wagons.

GROUP F: Off-road Equipment (over 40 tons) Euclid, DJB.

GROUP G: Off-road Equipment (under 40 tons) Athey Wagons, Belly Articulated Dumps, Trailer Wagons.

GROUP H: Off-road Equipment(under 40 tons), Euclid.

GROUP HH: Off-road Equipment(under 40 tons) D.J.B.

GROUP I: Off-road Equipment(under 40 tons) Darts.

GROUP II: Off-road Equipment(under 40 tons) RXS.

WAGES:(per hour)

07/01/2021

GROUP A	\$ 42.47*
GROUP AA	45.27*
GROUP B	43.09*
GROUP BB	42.59*
GROUP C	45.22*
GROUP D	42.92*
GROUP E	43.47*
GROUP F	44.47*
GROUP G	43.22*
GROUP H	43.84*
GROUP HH	44.22*
GROUP I	43.97*
GROUP II	44.34*

* To calculate premium wage, subtract \$.20 from the hourly wage.

Note: Fuel truck operators on construction sites addit. \$5.00 per day.
For work on hazardous/toxic waste site addit. 20% of hourly rate.

Shift Differential: When mandated by the contracting agency, DOT, or any governmental agency contracts shall receive a shift differential of fifteen (15%) above the wage rate.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker

First 40 hours	\$ 33.64
41st-45th hours	15.18
Over 45 hours	0.26

OVERTIME PAY

See (B, E, P, R) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 9, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 9, 15, 25) on HOLIDAY PAGE

8-456

Welder

01/01/2022

JOB DESCRIPTION Welder

DISTRICT 1

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour 07/01/2021

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

- (AA) Time and one half of the hourly rate after 7 and one half hours per day
- (A) Time and one half of the hourly rate after 7 hours per day
- (B) Time and one half of the hourly rate after 8 hours per day
- (B1) Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday.
Double the hourly rate for all additional hours
- (B2) Time and one half of the hourly rate after 40 hours per week
- (C) Double the hourly rate after 7 hours per day
- (C1) Double the hourly rate after 7 and one half hours per day
- (D) Double the hourly rate after 8 hours per day
- (D1) Double the hourly rate after 9 hours per day
- (E) Time and one half of the hourly rate on Saturday
- (E1) Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
- (E2) Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E3) Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
- (E4) Saturday and Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E5) Double time after 8 hours on Saturdays
- (F) Time and one half of the hourly rate on Saturday and Sunday
- (G) Time and one half of the hourly rate on Saturday and Holidays
- (H) Time and one half of the hourly rate on Saturday, Sunday, and Holidays
- (I) Time and one half of the hourly rate on Sunday
- (J) Time and one half of the hourly rate on Sunday and Holidays
- (K) Time and one half of the hourly rate on Holidays
- (L) Double the hourly rate on Saturday
- (M) Double the hourly rate on Saturday and Sunday
- (N) Double the hourly rate on Saturday and Holidays
- (O) Double the hourly rate on Saturday, Sunday, and Holidays
- (P) Double the hourly rate on Sunday
- (Q) Double the hourly rate on Sunday and Holidays
- (R) Double the hourly rate on Holidays
- (S) Two and one half times the hourly rate for Holidays

- (S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.
- (T) Triple the hourly rate for Holidays
- (U) Four times the hourly rate for Holidays
- (V) Including benefits at SAME PREMIUM as shown for overtime
- (W) Time and one half for benefits on all overtime hours.
- (X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

- (1) None
- (2) Labor Day
- (3) Memorial Day and Labor Day
- (4) Memorial Day and July 4th
- (5) Memorial Day, July 4th, and Labor Day
- (6) New Year's, Thanksgiving, and Christmas
- (7) Lincoln's Birthday, Washington's Birthday, and Veterans Day
- (8) Good Friday
- (9) Lincoln's Birthday
- (10) Washington's Birthday
- (11) Columbus Day
- (12) Election Day
- (13) Presidential Election Day
- (14) 1/2 Day on Presidential Election Day
- (15) Veterans Day
- (16) Day after Thanksgiving
- (17) July 4th
- (18) 1/2 Day before Christmas
- (19) 1/2 Day before New Years
- (20) Thanksgiving
- (21) New Year's Day
- (22) Christmas
- (23) Day before Christmas
- (24) Day before New Year's
- (25) Presidents' Day
- (26) Martin Luther King, Jr. Day
- (27) Memorial Day
- (28) Easter Sunday

(29) Juneteenth



New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12240

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By:

(Check Only One)

☐

Contracting Agency

☐

Architect or Engineering Firm

☐

Public Work District Office

Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address ☐ (Check if new or change)

Telephone: ()

Fax: ()

E-Mail:

2. NY State Units (see Item 5)

☐ 01 DOT

☐ 02 OGS

☐ 03 Dormitory Authority

☐ 04 State University
Construction Fund

☐ 05 Mental Hygiene
Facilities Corp.

☐ 06 OTHER N.Y. STATE UNIT

☐ 07 City

☐ 08 Local School District

☐ 09 Special Local District, i.e.,
Fire, Sewer, Water District

☐ 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
- ☐ Guards, Watchmen
- ☐ Janitors, Porters, Cleaners, Elevator Operators
- ☐ Moving furniture and equipment
- ☐ Trash and refuse removal
- ☐ Window cleaners
- ☐ Other (Describe)

9. Has this project been reviewed for compliance with the Wicks Law involving separate bidding?

YES ☐ NO ☐

10. Name and Title of Requester

Signature



NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

**LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE
AWARDED ANY PUBLIC WORK CONTRACT**

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: <https://applications.labor.ny.gov/EDList/searchPage.do>

For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322

NYSDOL Bureau of Public Work Debarment List 12/22/2021

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	NYC	*****9839	A.J.S. PROJECT MANAGEMENT, INC.		149 FIFTH AVENUE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL	*****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	*****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC	*****6775	ADVENTURE MASONRY CORP.		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC		AGOSTINHO TOME		405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		AMJED PARVEZ		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL		ANGELO GARCIA		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL		ANITA SALERNO		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	NYC		ANTHONY J SCLAFANI		149 FIFTH AVE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL		ANTHONY PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10323	01/23/2017	01/23/2022
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		ARADCO CONSTRUCTION CORP		115-46 132RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
DOL	DOL		ARVINDER ATWAL		65 KENNETH PLACE NEW HYDE PARK NY 11040	07/19/2017	07/19/2022
DOL	NYC	*****6683	ATLAS RESTORATION CORP.		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	NYC	*****5532	ATWAL MECHANICALS, INC		65 KENNETH PLACE NEW HYDE PARK NY 11040	07/19/2017	07/19/2022
DOL	NYC	*****2591	AVI 212 INC.		260 CROPEY AVENUE APT 11GBROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	NYC		AVM CONSTRUCTION CORP		117-72 123RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	NYC	*****8416	BEAM CONSTRUCTION, INC.		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	DOL		BERNARD BEGLEY		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	NYC	*****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
DOL	DOL	*****3627	BJB CONSTRUCTION CORP.		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DA		BOLTER CONSTRUCTION		2549 LINDEN STREET BELLMORE NY 11710	12/22/2016	12/22/2021
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025

NYSDOL Bureau of Public Work Debarment List 12/22/2021

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DOL	DOL		BRUCE P. NASH JR.		5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****0225	C&D LAFACE CONSTRUCTION, INC.		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****8809	C.B.E. CONTRACTING CORPORATION		310 MCGUINNESS BLVD GREENPOINT NY 11222	03/07/2017	03/07/2022
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	*****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	12/04/2018	12/04/2023
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		CANTISANI & ASSOCIATES LTD		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARMEN RACHETTA		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL		CARMENA RACHETTA		8531 OSWEGO ROAD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	*****1143	CARMODY BUILDING CORP	CARMODY CONTRACTIN G AND CARMODY CONTRACTIN G CORP.	442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY CONCRETE CORPORATION			06/12/2018	06/12/2023
DOL	DOL		CARMODY ENTERPRISES, LTD.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY INC		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3812	CARMODY INDUSTRIES INC			06/12/2018	06/12/2023
DOL	DOL		CARMODY MAINTENANCE CORPORATION		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY MASONRY CORP		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****8809	CBE CONTRACTING CORP		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	AG		CESAR J. AGUDELO		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL	*****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	NYC		CHARLES ZAHRADKA		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER J MAINI		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		CHRISTOPHER PAPASTEFANOU A/K/A CHRIS PAPASTEFANOU		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	*****1927	CONSTRUCTION PARTS WAREHOUSE, INC.	CPW	5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	*****3228	CROSS-COUNTY LANDSCAPING AND TREE SERVICE, INC.	ROCKLAND TREE SERVICE	26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL	*****2524	CSI ELECTRICAL & MECHANICAL INC		42-32 235TH ST DOUGLSTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		DALJIT KAUR BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL	*****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025

NYSDOL Bureau of Public Work Debarment List 12/22/2021

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DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	DOL		DEBBIE STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	AG		DEBRA MARTINEZ		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DF CONTRACTORS OF ROCHESTER, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DF CONTRACTORS, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	NYC		DIMITRIOS TSOUMAS		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	DOL		DOMENICO LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	*****3242	DONALD R. FORSAY	DF LAWN SERVICE	1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DONALD R. FORSAY		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	NYC		DUARTE LOPES		66-05 WOODHAVEN BLVD. STE 2REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	DOL	*****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL		EAST COAST PAVING		2238 BAKER RD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DA		EDWIN HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	NYC	*****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL		FRANK BENEDETTO		19 CATLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL	*****4722	FRANK BENEDETTO AND CHRISTOPHER J MAINI	B & M CONCRETE	19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	NYC		FRANK MAINI		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DA		FREDERICK HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	NYC	*****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEDOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
DOL	NYC		GAYATRI MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		GEOFF CORLETT		415 FLAGGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		GIOVANNI LAFACE		8531 OSWEGO RD BALDWINSVILLE NY 13027	02/03/2020	01/09/2023
DOL	NYC	*****3164	GLOBE GATES INC	GLOBAL OVERHEAD DOORS	405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		GREAT ESTATE CONSTRUCTION, INC.		327 STAGG ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	DOL		GREGORY S. OLSON		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC	*****3228	HEIGHTS ELEVATOR CORP.		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023

NYSDOL Bureau of Public Work Debarment List 12/22/2021

Article 8

DOL	DOL	*****5131	INTEGRITY MASONRY, INC.	M&R CONCRETE	722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		IRENE KASELIS		32 PENNINGTON AVE WALDWICK NJ 07463	05/30/2019	05/30/2024
DOL	DOL	*****9211	J. WASE CONSTRUCTION CORP.		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		J.A. HIRES CADWALLADER		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JAMES C. DELGIACCO		722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		JAMES J. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL		JAMES LIACONE		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JAMES RACHEL		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	*****7993	JBS DIRT, INC.		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	*****5368	JCH MASONRY & LANDSCAPING INC.		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE 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	AG		JOHN ANTHONY MASSINO		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JOHN F. CADWALLADER		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4612	JOHN F. CADWALLADER, INC.	THE GLASS COMPANY	P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		JOHN LUCIANO			05/14/2018	05/14/2023
DOL	DOL		JOHN MARKOVIC		47 MANDON TERRACE HAWTHORN NJ 07506	03/29/2021	03/29/2026
DOL	DOL		JOHN WASE		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	AG	*****0600	JOHNCO CONTRACTING, INC.		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORGE RAMOS		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	DOL		JORI PEDERSEN		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		JOSE CHUCHUCA		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JOSEPH FOLEY		66-05 WOODHAVEN BLVD. STE 2REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	NYC		JOSEPH MARTINO		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		JOY MARTIN		2404 DELAWARE AVE NIGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	*****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL	*****5062	K R F SITE DEVELOPMENT INC		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	NYC		K.S. CONTRACTING CORP.		29 PHILLIP DRIVE PARSIPPANY NJ 07054	02/13/2017	02/13/2022
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	DOL		KATE E. CONNOR		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KATIE BURDICK		2238 BAKER RD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL	*****2959	KELC DEVELOPMENT, INC		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026

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DOL	DOL		KENNETH FIORENTINO		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	DOL		KIMBERLY F. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	*****3490	L & M CONSTRUCTION/DRYWALL INC.		1079 YONKERS AVE YONKERS NY 10704	08/07/2018	08/07/2023
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL	*****4505	LARAPINTA ASSOCIATES INC		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	08/14/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	08/14/2017	08/14/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DA	*****4460	LONG ISLAND GLASS & STOREFRONTS, LLC		4 MANHASSET TRL RIDGE NY 11961	09/06/2018	09/06/2023
DOL	AG	*****4216	LOTUS-C CORP.		81-06 34TH AVENUE APT. 6E JACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL		LOUIS A. CALICCHIA		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	DOL		M ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		M. ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
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	NYC		MAREK FABIJANOWSKI		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	NYC		MARIA NUBILE		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	NYC		MARTINE ALTER		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	DOL		MARVIN A STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		MASONRY CONSTRUCTION, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3333	MASONRY INDUSTRIES, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023

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DOL	NYC		MATINA KARAGIANNIS		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2023
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL		MAURICE GAWENO		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		MCLEAN "MIKKI BEANE"		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MCLEAN "MIKKI" DRAKE		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MCLEAN M DRAKE-BEANE		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	*****9445	MCLEAN M WALSH	ELITE PROFESSION AL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL	*****9445	MCLEAN M WALSH	ELITE PROFESSION AL PAINTING OF CNY	1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
DOL	DOL		MICHAEL LENIHAN		1079 YONKERS AVE UNIT 4YONKERS NY 10704	08/07/2018	08/07/2023
DOL	AG		MICHAEL RIGLIETTI		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL	*****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024
DOL	NYC	*****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	*****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	NYC	*****3826	MOVING MAVEN OF NY, INC.		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	NYC	*****3550	MOVING MAVEN, INC		1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	AG		MSR ELECTRICAL CONSTRUCTION CORP.		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		NAMOW, INC.		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DA	*****9786	NATIONAL INSULATION & GC CORP		180 MILLER PLACE HICKSVILLE NY 11801	12/12/2018	12/12/2023
DOL	DOL	*****3684	NATIONAL LAWN SPRINKLERS, INC.		645 N BROADWAY WHITE PLAINS NY 10603	05/14/2018	05/14/2023
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	*****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTI ON, INC.	444 SCHANTZ ROAD ALLENTOWN PA 18104	09/17/2020	09/17/2025
DOL	DOL	*****0065	NORTHEAST LANDSCAPE AND MASONRY ASSOC		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL	*****1845	OC ERECTERS, LLC A/K/A OC ERECTERS OF NY INC.		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	NYC		PARESH SHAH		29 PHILLIP DRIVE PARSIPPANY NJ 07054	02/13/2017	02/13/2022
DOL	DOL		PAULINE CHAHALES		935 S LAKE BLVD MAHOPAC NY 10541	03/02/2021	03/02/2026
DOL	NYC	*****9422	PELIUM CONSTRUCTION, INC.		22-33 35TH ST. ASTORIA NY 11105	12/30/2016	12/30/2021
DOL	DOL		PETER M PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL		PETER STEVENS		11 OLD TOWN ROAD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DOL		PIERRE LAPORT		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	DOL	*****1543	PJ LAPORT FLOORING INC		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	DOL	*****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025

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DOL	NYC	****4532	PROFESSIONAL PAVERS CORP.		66-05 WOODHAVEN BLVD. REGO PARK NY 11374	04/20/2017	04/20/2022
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL	****2633	RAW POWER ELECTRIC CORP		3 PARK CIRCLE MIDDLETOWN NY 10940	01/30/2018	01/30/2023
DOL	AG	****7015	RCM PAINTING INC.		69-06 GRAND AVENUE 2ND FLOORMASPETH NY 11378	02/07/2018	02/07/2023
DOL	DA	****7559	REGAL CONTRACTING INC.		24 WOODBINE AVE NORTHPORT NY 11768	10/01/2020	10/01/2025
DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	****9148	RICH T CONSTRUCTION		107 WILLOW WOOD LANE CAMILLUS NY 13031	11/13/2018	11/13/2023
DOL	DOL		RICHARD MACONE		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL	****9148	RICHARD TIMIAN	RICH T CONSTRUCTION	108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	11/13/2018	11/13/2023
DOL	DOL		ROBBYE BISSEAR		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	NYC		ROBERT HOHMAN		149 FIFTH AVE NEW YORK NY 10010	12/29/2016	12/29/2021
DOL	DOL		RODERICK PUGH		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL	****4880	RODERICK PUGH CONSTRUCTION INC.		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		ROSEANNE CANTISANI			06/12/2018	06/12/2023
DOL	DOL		RYAN ALBIE		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	DOL	****3347	RYAN ALBIE CONTRACTING INC		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	DOL	****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD P.O BOX 408MONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	****7730	S C MARTIN GROUP INC.		2404 DELAWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		SAL FRESINA MASONRY CONTRACTORS, INC.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		SAL MASONRY CONTRACTORS, INC.		(SEE COMMENTS) SYRACUSE NY 13202	07/16/2021	07/16/2026
DOL	DOL	****9874	SALFREE ENTERPRISES INC		P.O BOX 14 2821 GARDNER RDPOMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		SALVATORE A FRESINA A/K/A SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	DOL		SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	NYC	****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC		SANDEEP BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	NYC	****1130	SCANA CONSTRUCTION CORP.		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025

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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	DOL	*****9751	SCW CONSTRUCTION		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	NYC	*****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL	*****1961	SHANE BURDICK	CENTRAL TRAFFIC CONTROL, LLC.	2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE NOLAN		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	*****0816	SOLAR ARRAY SOLUTIONS, LLC		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	*****0440	SOLAR GUYS INC.		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	NYC		SOMATIE RAMSUNAHAI		115-46 132ND ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL	*****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	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	*****9751	STEPHEN C WAGAR		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	DOL		STEVE TATE		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		STEVEN MARTIN		2404 DELWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		STEVEN TESTA		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
DOL	DOL	*****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	NYC	*****5863	SUKHMANY CONSTRUCTION, INC.		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL	*****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL	*****8209	SYRACUSE SCALES, INC.		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		TALAILA OCAMPA		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL	*****9733	TERSAL CONSTRUCTION SERVICES INC		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13208	07/16/2021	07/16/2026
DOL	DOL		TERSAL CONTRACTORS, INC.		221 GARDNER RD P.O BOX 14POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		TERSAL DEVELOPMENT CORP.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		TEST		P.O BOX 123 ALBANY NY 12204	05/20/2020	05/20/2025
DOL	DOL	*****6789	TEST1000		P.O BOX 123 ALBANY NY 12044	03/01/2021	03/01/2026
DOL	DOL	*****5570	TESTA CORP		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022

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DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATION	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	*****5766	THE COKER CORPORATION	COKER CORPORATION	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DA	*****4106	TRIPLE H CONCRETE CORP		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	*****6392	V.M.K CORP.		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL	*****6418	VALHALLA CONSTRUCTION, LLC.		796 PHLEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	*****7361	VIALE HOLDINGS, INC.	MOVING MAVEN	1010 NORTHERN BLVD. GREAT NECK NY 11021	03/09/2017	03/09/2022
DOL	NYC	*****2426	VICKRAM MANGRU	VICK CONSTRUCTION	21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	NYC		VICKRAM MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		VICTOR ALICANTI		42-32 235TH ST DOUGLSTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		VIKTAR PATONICH		2630 CROPSY AVE BROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC		VITO GARGANO		1535 RICHMOND AVE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC	*****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	*****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		WHITE PLAINS CARPENTRY CORP		442 ARMONK RD	06/12/2018	06/12/2023
DOL	DOL		WILLIAM C WATKINS		1229 JAMES STREET SYRACUSE NY 13203	05/02/2017	05/02/2022
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 CONTRACTING, INC.	54 PENTAQUIT AVE BAYSHORE NY 11706	01/19/2021	01/19/2026
DOL	DOL	*****4043	WINDSHIELD INSTALLATION NETWORK, INC.		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****4730	XGD SYSTEMS, LLC	TDI GOLF	415 GLAGE AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	NYC		ZAKIR NASEEM		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	NYC	*****8277	ZHN CONTRACTING CORP		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022

GOVERNING LAWS

This project is governed by, but not limited to, the following laws:

- General Municipal Law, Section 101, regarding separate contracts when total project exceeds \$50,000.
- General Municipal Law, Section 103-d, regarding non-collusive bidding clause.
- General Municipal Law, Section 106-b, regarding payment of contractors and subcontractors.
- General Municipal Law, Section 108, regarding Worker's Compensation Insurance.
- General Municipal Law, Section 109, regarding non-assignment of public contract.
- Labor Law, Section 220, subdivision 2, regarding 40-hour week, 8-hour day.
- Labor Law, Section 220-d, regarding wage rates and supplements.
- Labor Law, Section 220-3, regarding anti-discrimination.
- Labor Law, Section 222-a, regarding elimination of dust hazard.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 1A - SCHEDULES AND REPORTS

CONTENTS:

1. Summary of the Work
2. Laws, Ordinances, Taxes, and Permits
3. Plan of Operations and Progress Schedule
4. Sequence of Work
5. Contractor's Examination
6. Notification of Owner and Architect
7. Access and Movement of Materials and Personnel
8. Job Meetings
9. Equal Opportunity
10. Wage Rates

1. SUMMARY OF THE WORK:

- A. All work as shown on the drawings and as specified herein.

2. LAWS, ORDINANCES, TAXES, AND PERMITS:

A. Taxes and Permits:

1. Exempt from New York State Sales Tax.
2. Exempt from Federal Excise Tax.
3. Not subject to building permit fees.

B. Laws and Ordinances:

The Project is subject to and Contractor shall comply with:

1. New York State Wage Rate Requirements.
2. Federal Occupational Safety and Health Administration Standards.
3. Applicable local, state, and other governing safety regulations.

3. PLAN OF OPERATIONS AND PROGRESS SCHEDULES:

- A. In order to facilitate coordination and fitting, the Contractor shall prepare a "Plan of Operations and Progress Schedule" which shall show concisely the manner in which work will be started, prosecuted, and completed.
- B. After approval of the above document, the Contractor shall be responsible for seeing that it is adhered to and for ascertaining that proper coordination is maintained between work of all Contracts.

4. SEQUENCE OF WORK:

- A. It is intended that the work under this Contract be executed without interruption of and with minimum interference with school operations.

- B. Notify utility companies as required by local ordinance and State Law.
- C. Ascertain location of utilities inside and outside of building before commencing demolition work of any kind.
- D. Take precautions to protect the adjacent spaces and surfaces from flying or falling debris. Prevent dust and dirt from rising and clean any dust created by this work.
- E. Contractor shall not employ any labor, materials, or means whose employment or utilization during the course of the work tend to or in any way cause or result in strikes, work stoppages, delays, suspension of work, or similar troubles by workmen under his employ, his Subcontractors, or any of the trades working in or about the premises where work of this Contract is being performed.
- F. The work shall be done with due care; the Contractor will be held responsible for any damage which may be caused thereby to any part or parts of existing structures, site, or items designated to remain. Before proceeding with demolition work, ascertain need for and accomplish any required protection measures. Embedded anchorage and attachments shall be removed to permit proper patching. Contractor will be liable for damage caused to any parts of existing structure or work designated to remain.
- G. Where removal work occurs or where new and old work join, the immediate adjacent surfaces or so much thereof as is required by the involved conditions shall be cut, removed, patched, repaired, or refinished, and left in as good a condition as existed prior to the commencing of the work. The materials and workmanship employed shall conform to that of the original work.
- H. The Contractor shall establish and maintain a rate of work progress so as to insure completion of the construction operations within the time stipulated in the Agreement.
- I. Where materials or construction are to be applied or attached to existing surfaces or construction and to have included in his bid all costs for preparatory work on such surfaces or construction as necessary to permit the proper execution of the required work.
- J. Upon completion of all work under this Section, the Contractor shall remove all tools, materials, plant, apparatus, and rubbish of any sort. The premises shall be left clean, neat, and orderly to the entire satisfaction of the Architect.

5. CONTRACTOR'S EXAMINATION:

- A. Contractor shall take all field measurements as required and shall satisfy himself as to the nature of equipment and facilities required for and the conditions under which he will be obliged to carry out the execution of the work in every particular which might in any way affect the cost thereof. The submission of a Proposal will be construed as conclusive evidence that such an examination has been made, and no subsequent claims for additional costs of labor, materials, appliances, equipment, etc., or for difficulties

encountered which could have been foreseen has such an examination been made, will be recognized.

6. NOTIFICATION OF OWNER AND ARCHITECT:

- A. Before starting any work relating to existing utilities or school services, the Contractor will be required to give 24 hours notice to the Architect and Owner and obtain their approval in writing before proceeding with such work.
- B. All work involving active utility or school service shall be performed with the utmost dispatch and without discontinuance or disruption of such services except as and when approved by the Owner.

7. ACCESS AND MOVEMENT OF MATERIALS AND PERSONNEL:

- A. The direction of the Owner as to access to the existing building and the limits within which each Contractor shall control the movements of his personnel and materials shall be strictly followed. Generally, the movement of Contractor's personnel within the premises shall be restricted to the minimum necessary for the performance of required work. Under no circumstances shall Contractor's personnel at any time enter upon any portions of the building or premises where such entry is not strictly necessitated by the work required under this Contract. The Contractor shall rigidly enforce these restrictions; violation thereof shall be cause for dismissal of the offender.
- B. Delivery of equipment and materials shall be confined to the limits designated, and storage shall be where directed by the Owner. Temporary enclosures necessary for such storage shall be provided by the Contractor and shall be removed when no longer required.
- C. All work in the existing building shall be performed with the least possible annoyance to the occupants of the building.

8. JOB MEETINGS:

- A. Pre-Construction Conference: Upon receiving notice that he has been awarded the Construction Contract for the project, and within ten (10) days of such notice, the Contractor shall make an appointment to meet with the Owners Representative(s), and shall also instruct his Subcontractors or their representatives to be made personally known to each other and to plan and initiate the most favorable course of the upcoming construction work.
- B. Regular Job Meeting: The Contractor, Owners Representative(s), and those Subcontractors whose presence is necessary, shall attend periodic meetings for the purpose of discussing the progress and execution of the work. These meetings shall be held at a time and place designated by the Owner's Representative. The proceedings of these meetings will be recorded by the Owner's Representative and a copy will be subsequently furnished the Contractor for his use. It

will be the Contractor's responsibility to distribute copies, as may be required, to his Subcontractors.

9. EQUAL OPPORTUNITY (LABOR LAW SECTION 220-3):

- A. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor shall take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training including apprenticeship. The Contractor agrees to post, in conspicuous places available to employees and applicants for employment, notices to be provided setting forth the provisions of the non-discrimination clause.
- B. The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- C. The Contractor shall send to each labor union or representative of workers with which he has a collective bargaining agreement or other Contract or understanding a notice to be provided advising the said labor union or worker's representatives of the Contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- D. The Contractor shall comply with Executive Order 11246, Federal Equal Employment Opportunity, unless exempt, in accordance with Section 203 of this order.

10. WAGE RATES:

- A. The Labor Law of New York State provides, among other things, that it shall be the duty of the fiscal officer to make a determination of the schedule of wages to be paid to all laborers, workmen, and mechanics employed on public work projects including supplements for welfare, pension, retirement, vacation, and other benefits, in accordance with prevailing practice in the locality. The Contractor shall comply with all requirements of this law as it applies to this project and locality.
- B. The rates of wages determined by the New York State Industrial Commissioner pursuant to the Labor Law are set forth as per the schedule contained within this Project Manual.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 1B - TEMPORARY SERVICES AND MISCELLANEOUS REQUIREMENTS

CONTENTS:

1. Scope
2. Temporary Utilities
3. Temporary Barricades
4. Fire Protection
5. Parking and Traffic Control
6. Restoration of Premises
7. Cutting and Patching
8. Rough Openings and Routine Items
9. Water Tightness
10. Miscellaneous Requirements

1. SCOPE:

- A. Provide, maintain, and remove when no longer required temporary services and utilities as specified, except as may be otherwise provided by the Owner; include costs of obtaining permits, labor, equipment, fixtures, lamps, and similar items as well as duties, levies, or taxes imposed.

2. TEMPORARY UTILITIES:

- A. Water and electricity for construction purposes in quantities judged reasonable by the Architect will be furnished to the Contractor by the Owner without charge. The Contractor shall ascertain where these services will be available, make temporary connections as required, and remove same upon completion.
- B. Temporary toilets: The Owner will not allow the use of toilets within the building. The GC shall provide temporary toilet facilities for use by all trades during the course of the work. The GC shall maintain the temporary toilet facilities in sanitary condition for the duration of the contract, and, upon completion of the work, remove them from the site.

3. TEMPORARY BARRICADES:

- A. Temporary closures and barricades, as may be required to maintain and protect the new and existing work and to protect the public from danger, shall be provided.
- B. Protect temporary closures and barricades to guard new and existing work from vandalism during and after working hours.

4. FIRE PROTECTION AND PREVENTION:

- A. Each Prime Contractor shall take all precautions required to prevent fires as a result of his operations. Flame cutting torches, blow torches, or welding tools shall be used in strict accordance with applicable safety rules and regulations.

- B. When welding tools or torches of any type are in use, the Prime Contractor using such equipment shall have available a fire extinguisher of the Multi-Purpose Type ABC in the immediate vicinity of the work. The fire extinguishers shall be provided and maintained by said Contractor in usable condition at all times.
- C. In addition to the requirements of Paragraphs A and B above, the General Work Contractor shall provide fire extinguishers in working order located at intervals throughout the construction operations. These extinguishers shall not be removed from their mounting except to be tested or for the purpose of fighting a fire. They shall be relocated as necessary by the General Work Contractor when progress of the work demands. These fire extinguishers will remain the property of the General Work Contractor.
- D. Keep fire hydrants on or adjacent to the work accessible to fire fighting equipment at all times.

5. PARKING AND TRAFFIC CONTROL:

- A. Parking on site will be at the Owner's discretion and approval only.
- B. Protect existing roads and repair damage caused to road or site.

6. RESTORATION OF PREMISES:

- A. Walls and floor areas and any other surfaces that are broken, damaged, pitted, or otherwise defective as a result of receiving, handling, or storage of materials or the performance of any work under any Contract, or by reason of neglect of any Contractor, shall be fully restored to the satisfaction of the Owner, and the full cost, therefore, shall be borne by the Contractor.
- B. Sites shall be cleaned daily and restored to original condition at completion of construction operations.
- C. Roll-offs shall be located so as not to interfere with school operations, and paving or landscaping shall be restored when removals are completed.

7. CUTTING AND PATCHING:

- A. Cutting and patching covers adjustment to, necessary reworking, or removal of elements of construction in both new and existing work to comply with work of the Contract documents. The following definitions for cutting and patching apply:
 - 1. Cutting: Physical modification or removal of construction work (walls, floors, ceilings, roofs, etc.) or installed materials (doors, windows, panels, etc.), both new, factory-finished, and existing.
 - 2. Patching: Restoration or replacement of construction work (walls, floors, ceilings, roofs, etc.), both new, factory-finished, and existing. Patching shall include installation of new finish, materials, and reconstruction of walls, floors, etc. All patching shall match adjacent materials and finishes unless otherwise indicated.

- B. Each Prime Contractor, unless otherwise indicated, shall hire a qualified General Contractor to provide all equipment, labor, material, and incidentals necessary for cutting and patching as required for the installation of his work in new or existing walls, floors, and ceilings.
- C. Each Prime Contractor will be held responsible for his own and his Subcontractors' work in cutting and patching and the correction of the work of other Prime Contractors if damaged by him.
- D. Each Prime Contractor shall bear the expense of all cutting, patching, repairing, or replacing of the work of other trades made necessary by any fault, error, or tardiness on the part of or damage done by him. He shall employ and pay the Contractor whose work is involved.
- E. In existing structures, each Prime Contractor shall, unless otherwise indicated, hire a General Contractor to do all cutting, patching, repairing, or replacing of General Work required for the removal of existing work or installation of his new work. Secure approval before cutting.
- F. In no case may floors, walls, or ceilings that are waterproofed be cut for the admission of any equipment or materials nor may any structural member be pierced without written permission.
- G. Where roofing or waterproofing membranes must be cut to accommodate the work of any Prime Contractor, such Prime Contractor shall employ a qualified roofing Contractor to do all required cutting, patching, and repairs of the roofing or waterproofing, and then only after approval of the methods proposed by the Architect and/or any agency that may have a roof bond or guarantee/warranty in force.
 - 1. Approval of all materials, methods, and roofing Contractor used in cutting, patching, and repairing existing roofing membrane shall be obtained from agency, or agencies, holding a roof bond or guarantee/warranty in force.

8. ROUGH OPENINGS AND ROUTINE ITEMS:

- A. Each Prime Contractor will provide all openings, chases, recesses, lintels, and bucks in new or existing construction that are required for the admission of his work.
- B. Each Prime Contractor shall furnish all necessary information (i.e. location and size of openings, chases, etc., and other built-in field conditions) to the other Prime Contractors in ample time for the installation of his work.
 - 1. Ample time shall mean:
 - a. In concrete work, before reinforcing is placed.
 - b. In masonry, before wall construction reaches location of opening, chase, or other item.

- c. In drywall, before second or finish face is applied.
- 2. This paragraph shall not be construed to include any items in earth such as trenches, etc.

9. WATER TIGHTNESS:

- A. Each Prime Contractor shall be held responsible for the water tightness of his respective products, materials, and workmanship as installed in the job. This includes all work either specified to be watertight or inferred by general practice to be watertight. All walls, roofs, glazing, windows, doors, sleeves, through foundation or walls, flashings, and other items shall be in a watertight condition before final payment is requested.
- B. If a Prime Contractor feels that the details or materials, as drawn or specified, are not satisfactory to produce a watertight job, he shall so inform the Architect before installation. The Prime Contractor shall submit his proposed substitution or alternative method of doing the work for the Architect's approval. Any approved change shall be executed by the Prime Contractor and made watertight at no additional cost to the Owner.
- C. Any proposed changes encountered during the bidding procedure may be submitted in the proper form and time to the Architect for consideration as a change to be covered by ADDENDA.

10. MISCELLANEOUS REQUIREMENTS:

- A. Contractor shall verify all existing conditions prior to proceeding with new work installations.
- B. Contractor shall be responsible for all verification of dimensions shown.
- C. Contractor shall retain all existing fire exit locations with the school complex during construction as necessary to provide safe egress to all inhabitants as per State and Local Codes.
- D. Contractor shall seal all areas of construction to prevent dust and debris from entering areas other than location of installation.
- E. Contractor shall meet all OSHA requirements for sanding and sealing as required.
- F. Contractor shall protect all existing walls, equipment, and apparatus from damage during the construction process.
- G. Contractor shall construct Architect/O.S.H.A. approved, code compliant barricades and construction area separation between all proposed work and student occupied spaces. There shall be no interference with required educational capabilities during the construction of this project while classes are in session.
- H. Contractor shall relocate any existing H.V.A.C. intake/discharge

units as to prevent the distribution of any demolition/construction related fumes and dust during the course of the entire project. Relocate same to original functioning position upon project completion.

- I. All construction materials, equipment, personnel, debris, dust, fumes, noise, smells, etc. shall be isolated from building occupants and other vehicular traffic by way of "special necessary construction" during the entire construction process. provide all required temporary stairs, ramps, fire alarm systems, fire extinguishers, illuminated exit signs, door hardware, and floor finishes needed to maintain all occupied spaces safe and code compliant at all times.
- J. Contractor must provide schedules of work which include a minimum of 48 hours or manufacturer's recommended time for "baking out" and exhausting of volatile organic compounds used during construction prior to building occupancy. Provide and maintain at the site "MSDS" forms indicating safe times before occupancy of spaces.
- K. The District must provide a continuously updated written emergency exit plan which provides for the relocation of all students and staff immediately upon a break in the above required "separation of construction areas" as to minimize exposure to all students and staff. Coordinate with all contractors, building staff, and students for their use.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 1C - INSURANCE REQUIREMENTS

CONTENTS:

1. General Requirements
2. Certificates of Insurance
3. Types of Coverage and Minimum Limits
4. Indemnification
5. Continuity

1. GENERAL REQUIREMENTS:

- A. In addition to the requirements specified under Article II of the General Conditions and the insurance required by law, the Contractor shall, before commencing work under this Contract and during the period of construction to the date of final acceptance by the Owner, purchase, effect, and maintain insurance coverage as described in this section.
- B. No Subcontractor shall be permitted to undertake any portion of this Contract without first having presented to the Contractor certification attesting to similar coverages as are required of the Contractor under this section. Such certification shall be issued to and in a form acceptable to the Contractor.

2. CERTIFICATES OF INSURANCE:

- A. Certificates of Insurance shall be transmitted in duplicate to the Architect for forwarding to the Owner, and any Certificate found to be incomplete or not according to the proper form will be returned as being unsatisfactory. The prescribed form of Certificate of Insurance shall be A.I.A. Document G705 or other similar form approved by the Owner. The insurance company must be licensed as an "admitted carrier" by the State of New York and must have a "Best" rating of not lower than "A". A letter of transmittal from each insurance company involved must be submitted certifying that the certificate is issued pursuant to their authorization.
- B. Certificates shall contain:
 1. Name and address of the insured.
 2. Job location and title of the Contract.
 3. Policy number and expiration date.
 4. Issuance date of Certificate.
 5. Types of coverage included.
 6. Limit of Liability for each type used.
 7. Types of operations covered (Classifications).
 8. Types of operations or of coverages specifically excluded.
 9. Fifteen (15) day cancellation or non-renewal notice.
 10. Hold Harmless Clause indemnifying Owner and Architect.
 11. Owner and Architect as additional insured.

12. Name of Insurance Company.
 13. Counter Signature of Resident Agent in State of project location.
 14. Letter of transmittal from each insurance company.
- C. No Certificate covering policies containing escape clauses or exclusions contrary to the Owner's interests will be accepted.
 - D. The filing of Certificates of Insurance authorizes the Owner or Architect to make direct inquiry of and to receive direct response from the insurance carrier regarding questions arising during the performance of the work which are pertinent to the coverages under the policies.

3. TYPES AND MINIMUM LIMITS OF COVERAGE: See 'Insurance Requirements for Contractors / Subcontractors' in part S3 of the specification manual for additional specific coverage required by the Lindenhurst Memorial Library

A. General Municipal Law Section 108:

1. Workmen's Compensation: As required by State Statutes.
2. Comprehensive Liability: Combined single limit of \$1,000,000 per occurrence and a \$2,000,000 aggregate limit.
 - a. General Liability: \$1,000,000 each person.
 1. Bodily/Personal Injury: \$1,000,000 per person.
 2. Property Damage: \$1,000,000 per occurrence.
 - b. Umbrella policy with a limit of \$5,000,000 in excess of the General Liability limit
 - c. Automobile Liability:
 1. Bodily Injury including death: \$1,000,000 per person.
 2. Property Damage: \$1,000,000 per occurrence.
3. Builder's Risk Policy:
 - a. Installation floater or other applicable coverage for the project in a form satisfactory to the Owner and shall include:
 1. Interests of Owner and Contractor jointly.
 2. Coverage for Fire, Lightning, Explosion, Extended Coverage, Vandalism, Malicious Mischief, Windstorm, Hail, or Flood.
4. Contractor's Contingent Liability: The Contractor shall procure, pay for, and maintain such insurance as will protect the Contractor from his contingent liability for damages and for injury to the person or property of another which may arise from the operations of all Subcontracts under this Contract.

5. Contractor's and Employees' Equipment: The Contractor assumes responsibility for all injury to or destruction of the Contractor's materials, tools, machinery, equipment, appliances, shoring, scaffolding, false and form work, and personal property of Contractor's employees from whatever cause arises.

4. INDEMNIFICATION:

- A. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner and the Architect and their agents and employees from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of the work, provided that any such claim, damage, loss, or expense:
 1. is attributable to bodily injury, sickness, disease, or death, or to injury or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom; and
 2. is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.
- B. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Article.
- C. The indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor under Workmen's Compensation Acts, Disability Benefit Acts, or other Employee Benefit Acts.
- D. The obligations of the Contract under this Article shall not extend to the liability of the Architect, his agents, or employees, arising out of:
 1. the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs, or specifications; or
 2. the giving of or the failure to give directions or instructions by the Architect, his agents, or employees providing such giving or failure to give is the primary cause of the injury or damage.
- E. None of the foregoing provisions shall deprive either the Owner or the Architect of any action, right, or remedy otherwise available to them at common law. The provision of Article 4.18 shall apply to the extent permitted by law.

5. CONTINUITY:

- A. In the event of loss by fire or other insured hazard during the term of the Contract, the Contractor shall cooperate with the Owner and Architect and the insurance adjusters in all procedures incidental to the expeditious adjustment of the loss and shall during this period maintain progress of construction. The Contractor will not be relieved from his obligations for the proper execution of his Contract except that the time of completion may be extended for such number of days as may have been delayed by reason of such loss, as determined by the Architect.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 1D - PRODUCT APPROVAL STANDARD

CONTENTS:

1. Definitions
2. Proof of Compliance
3. Inclusion of Specification of Non-Specified Products
4. Consideration of Equivalents After Award of Contract

1. DEFINITIONS:

- A. The term "product" shall include material, equipment, assembly methods, manufacturer, brand, tradename, or other description.
- B. Reference to be approved equal or similar terms mean that approval of the Architect is required.

2. PROOF OF COMPLIANCE:

- A. Whenever the Contract Documents require that a product be in accordance with Federal Specifications, ASTM Designation, ANSI Specification, or other Association Standard, the Contractor shall present an affidavit from the manufacturer of a proposed product certifying that it complies therewith.
- B. Where requested or specified, submit supporting test data to substantiate compliance.

3. INCLUSION IN SPECIFICATION OF NON-SPECIFIED PRODUCTS:

- A. If a Contractor has based his bid upon products, materials, or items not specifically described or named in the specifications, he may be required, prior to Award of Contract, to submit the names, types, brand, or manufacturer of products included in his bid for the specified items.
- B. Supporting data documenting wherein the proposed materials, products, or equipment may vary from those specified may be required and will be the responsibility of the Contractor.
- C. The risk of whether bid equivalents will be accepted will be borne by the Contractor.

4. CONSIDERATION OF EQUIVALENTS AFTER AWARD OF CONTRACT:

- A. Equivalent products will be considered after Award of Contract if:
 1. Previously accepted or specified product is not available because of strike, lock out, bankruptcy, or discontinuance of its manufacture.
 2. Specified performance or guarantee cannot be attained in the

Contractor's judgement.

- B. Additional products, when submitted for consideration, must be accompanied by documentation attesting to the foregoing and establish equivalency in the judgement of the Architect, the burden of proof for which shall be the Contractors.
- C. Request for product changes, other than equivalents, if accepted, shall be effected by Change Order.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 1E - ALTERNATES

1. GENERAL REQUIREMENTS:

- A. Each Contractor shall state in his Proposal the amount to be added or deducted from his Base Bid for the difference in cost between the work described under each Alternate and the corresponding work specified under his Base Bid.
- B. Alternate bids shall reflect the increase or decrease in cost of all work of every nature which may be affected thereby, and no subsequent claims for extras by reason of the Contractor's failure to observe this requirement will be considered.
- C. Except as otherwise described or approved, material and workmanship required by the Alternates differ from the requirements shown on the drawings or specified for corresponding items, the Alternate's construction and materials will be subject to the approval of the Architect.
- D. Submit shop drawings and samples of the work under each accepted Alternate as per "General Conditions" requirements.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01015 - PROJECT SCHEDULE

1.01 SUMMARY

A. Section includes:

1. Work sequence.
2. Contractor use of premises.
3. Owner occupancy.

1.02 WORK SEQUENCE

A. Project Start:

1. Commence construction activity at the site as soon after contract award, unless specified otherwise, as required to comply with specified Construction Schedule.
2. Schedule material deliveries to correspond with starting dates so that materials are on site on required start date.

B. Coordination:

1. Schedule all construction activities at the site with Architect, Construction Manager (if applicable) Owner, and other prime contractors to avoid, to maximum extent, interference with Owner's operations and to meet specified completion dates.
 - a. It is the responsibility of all Prime Contractors to meet the Completion Schedule within the Owner's Educational Schedule.
 - b. Coordinate construction activities with school calendar issued by Owner to each Prime Contractor to avoid interference with normal educational process by Owner.
 - c. Review requirements of Contract Documents for each Prime Contract in relationship to requirements for other Prime Contractors and the Owner's Educational Schedule.
2. Coordinate all interruptions of building services or shut-down of building systems with Architect, Construction Manager (if applicable) and Owner, and obtain written approval of proposed schedule for interruptions or shut-down from Architect, Owner, and/or Construction Manager (if applicable).
 - a. If, in the opinion of the Owner or Construction Manager (if applicable), any such interruption or shut-down will affect life or safety of building occupants, schedule interruption of shut-down at a time acceptable to the Owner, when classes are not in session, or after normal working hours.

- b. Extra payment for overtime outside normal working hours required by any such interruption or shut-down will not be made by Owner. Prime Contractor requiring overtime shall do so at his own cost and shall be responsible for extra costs incurred by other Prime Contractors as a result.
- c. Insure all equipment, fittings, pipe, and similar items required are on hand before interrupting or shutting down existing systems.
- d. Notify all inspectors and representatives of utility companies, village officials, Architect, Construction Manager (if applicable), Owner, and similar parties by letter in advance of required changeovers, tie-ins, removals, and similar operations.

1.03 CONTRACTOR USE OF PREMISES

A. Access to Building:

- 1. All Prime Contractors are directed to schedule all construction activities with Owner to allow Owner's full use of building areas and systems for normal educational process. Owner acknowledges Prime Contractors will require access to Owner-occupied areas, rooms, and systems, and intends to cooperate in making rooms and systems available for construction activities.
- 2. Notify Project Representative in advance of any requirements for access to any existing building outside normal working hours and days.

B. Building Security:

- 1. Owner will maintain building security at all times for his sole benefit. Each Prime Contractor shall retain full responsibility for security and protection of work of his Prime Contract until final acceptance by the Owner.

C. Maintenance of Building Circulation and Exits:

- 1. Maintain circulation corridors, exits, and exit stairs unobstructed from equipment and materials, except in areas of construction activity closed by temporary partitions.

1.04 OWNER OCCUPANCY

- A. Normal School Year: Owner intends to maintain full education program during the normal school year throughout duration of project, and will make full use of buildings and sites, unless otherwise specified.
 - 1. School and special activities may be conducted within buildings and on sites after regular school hours and on weekends during the normal school year.

2. Free access by Owner's personnel to building and site areas not scheduled for alteration or dimensional change shall be maintained by all Prime Contractors.
3. Owner's personnel will perform normal custodial and maintenance services for building areas and systems not involved in construction activities, unless otherwise indicated.

B. Summer School:

1. Owner will staff the buildings with at least administrative, custodial, and maintenance personnel during the scheduled Summer Recess.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01020 - ALLOWANCES

1.01 WORK INCLUDED

- A. The Contractor shall provide all labor, materials, equipment and services so as to perform all work of this section and related work indicated on the Construction Drawings and as specified herein, including, but not limited to, the following:
1. Inclusion of the Allowances herein.
 2. In addition to the work indicated on the Construction Drawings and elsewhere in this Project Manual and specification, the Contractor shall perform additional work as may be ordered by the Owner's Representative, Owner, or Architect.
 3. The following amounts are for any additional work as may be required or ordered by the Owner, Owner's Representative, or Architect or required due to field related conditions. Any additional work relative to these allowances will be authorized and instituted through the Change Order process. Any unused portion in whole or in part of the allowance shall be refunded to the Owner, also through the Change Order process.
 4. The Contractor's costs for unloading and handling at the site, overhead, profit and other expenses contemplated for the stated allowance amounts shall be included in its contract sum and not in the allowances.

1.02 RELATED WORK

- A. Refer to the related and associated divisions of the Project Manual and Specification for related additional or supplementary details and information.

1.03 CONTRACT DOCUMENTS

- A. Applicable provision of the Conditions of the Contract shall govern all work under this section.

1.04 ALLOWANCES

1. Descriptions and values for allowances for all contracts are shown in the bid proposal form. The contractors total base bid amount shall include all allowances for that specific trade / contract.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01030 - SPECIAL PROCEDURES AND PROVISIONS

PART 1 - GENERAL

1.01 CONTRACTOR'S SUPERINTENDENT

- A. The Contractor must devote his time and personal attention to the work and shall employ and retain at the building from the commencement until the entire completion of the work a Contractor's Superintendent competent and capable of maintaining proper supervision and care of the work and acceptable to the Architect, who, in the absence of the Contractor and irrespective of any superintendent or foreman employed by any Subcontractor, shall see that the instructions of the Owner are carried out.
- B. The Contractor shall employ a competent senior superintendent. Such superintendent may not be replaced during the duration of the Project, including the completion of Punch List, unless approved by the Architect.
- C. The Contractor is to provide a resume of the Contractor's Superintendent to the Owner's Representative.
- D. The Contractor shall, at all times during the work, have a representative on site who communicates in English.

1.02 REPAIRING

- A. The Contractor shall do all repairing of work that becomes damaged by his workmen or the workmen of any of his subcontractors during the progress of his work or prior to its acceptance.
- B. All existing work that is damaged or disturbed during the alteration and finish work to the building shall be left in the condition as originally found.
- C. Any exterior areas damaged or disturbed by work of this Contract shall be properly repaired and left in sound condition and the premises shall be left clean and orderly.

1.03 CONTRACTOR'S RESPONSIBILITY

- A. The Contractor will be held responsible for all work and materials provided for by the plans and specifications until the work is completed and accepted. The Contractor will be held responsible also for any and all damages which may arise or occur to any party whomsoever by reason of work of this project, delivery and storing of materials, the opening or blocking of streets and walks or by neglecting to provide proper lights, guards, barriers, any other safeguards to prevent damage to property or injury to persons.
- B. Where openings cause exposure to outside elements, the Contractor shall provide necessary protection and coverings to prevent damage from frost or water.

- C. Provide and maintain temporary dustproof partitions to enclose spaces used by the Owner and relocate as required. Remove when no longer needed.
- D. The Contractor assumes responsibility for all injury to or destruction of or loss by theft or pilferage of the Contractor's materials, tools, machinery, equipment, appliances, shoring, scaffolding, false and form of work and personal property of his employees regardless of the cause.
- E. Each Contractor shall be responsible for their own material and equipment until completely installed, inspected for completeness and correctness, and signed off by the Architect or his duly appointed representative.
- F. The Contractor shall provide written guarantee of the complete installation to be free from defects in materials and workmanship in accordance with Section 01700. Any portion of the work judged inferior shall be replaced by the Contractor at no additional cost to the Owner.
- G. The cost/value of required repair/replacement of any non-conforming items as documented by the Architect's subject to inclusion in the Architects "Record of Unacceptable or Non-Conforming Work" and will be the subject of a fixed dollar amount of credit due to the Owner, prior to project closeout in enforcement of AIA Document A201, Item 12.3, "Acceptance of Non-Conforming Work". If the contractor delays resolution of non-conforming work, the fixed dollar amount of credit is subject to a proportional cost increase at the discretion of the Architect.
- H. The Contractor shall maintain operational exits, exit lights, danger signs, open trench markings, fire emergency equipment, night lights, and proper storage facilities for equipment and materials as directed through the length of the contract.
- I. The Contractor shall take over and maintain the site immediately after receiving the order to start work. Provide protection of property and utilities until work of the Contract is complete and accepted. The Contractor shall be responsible for the safety of any adjoining property, including paving, utility mains, pipes, conduit, etc., and shall, at his own expense, protect and maintain same in at least as good a condition as that in which they were found.
- J. All seeded areas, pavements, walks, curbs, and approaches shall be kept clear at all times and, if disturbed by this construction work, shall be repaired and restored with materials to match existing.
- K. Before commencing any work, the Contractor shall verify all dimensions, coverage, and conditions prevalent at the job sites. If no corrections are brought to the attention of the School District and the Engineer before starting installation, the Contractor will be totally responsible for the installation providing complete coverage of the area designated.

- L. For Additions to Existing Buildings: The General Contractor is responsible for correct finish floor alignment between existing building and proposed addition. At each finish floor, General Contractor shall utilize a licensed New York State surveyor to check all finish floor elevations shown for accuracy and shall be responsible for establishing said elevations prior to shop drawing submittal. The General Contractor's submission of steel and or concrete shop drawings shall contain said information and be the final basis for all other established elevations. The architect will accept said elevations as final, as the submission will include a licensed surveyor's certification of same.
- M. Upon completion of the work, the Contractor shall furnish as-built drawings showing the exact locations of every new item.
- N. It is assumed that Contractor's prices are based on scope of work complete and as confirmed by site(s) inspections prior to bidding.
- O. The Contractor shall be responsible for all incidental electric and plumbing work required to complete work under this Contract.
- P. The Contractor shall be required to conform to all OSHA requirements regarding Lock-out/Tag-out procedures. This shall include, but not be limited to, disconnecting the power to any equipment to be serviced via a disconnect switch or breaker, locking out this power source, and tagging this lockout with appropriate wording as per OSHA requirements. This shall apply to any power source associated with this project.
- Q. Safety and Security during Construction Statements: Refer to Specification Section 01050, Uniform Safety Standards for School Construction and Maintenance Projects; Commissioner's Regulation, Section 155.5 - Items 3a through 3e.
- R. Additional Requirements of the Contractor:
 - 1. No drinking of alcoholic beverages or use of controlled substances allowed on the grounds. No reporting to work impaired by alcohol or controlled substances is allowed. The Contractor bears the responsibility of determining if its, or its subcontractors, employees are in any way impaired which would jeopardize the safety of the public, the employees of other Contractors and their Subcontractors, the Owner, Architect, and Construction Manager.
 - 2. All Contractors are to refrain from conversing with school personnel and students. Any construction employees found doing so will be removed from the site.
 - 3. All Contractors are to refrain from using indecent language. All doing so will be removed from the site. Art work or decoration found on vehicles belonging to the Contractor's or Subcontractor's employees parked on or near the school property which contain indecent language or pictures shall either be covered or removed from the location.

- S. Separation of Construction Statement: Refer to Specification Section 01050, Uniform Safety Standards for School Construction and Maintenance Projects; Commissioner's Regulation, Section 155.5 - Item D.
1. A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs, or elevators designated for students or school staff.
 2. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
 3. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety, and educational capabilities at all times that classes are in session.
- T. Fire Prevention: There is no smoking allowed anywhere on school property per New York State law. Violators are subject to a \$1,000 fine and/or banishment from the property.
1. Any holes in floors or walls should be sealed with a fire-resistant material.
- U. Construction Noise: Refer to Specification Section 01050, Uniform Safety Standards for School Construction and Maintenance Projects; Commissioner's Regulation, Section 155.5 - Item H.
- V. Construction Fume Control: Refer to Specification Section 01050, Uniform Safety Standards for School Construction and Maintenance Projects; Commissioner's Regulation, Section 155.5 - Item I.
- W. Off-Gassing Control: Refer to Specification Section 01050, Uniform Safety Standards for School Construction and Maintenance Projects; Commissioner's Regulation, Section 155.5 - Item J.
- X. Asbestos Code Rule 56: Refer to Specification Section 01050, Uniform Safety Standards for School Construction and Maintenance Projects; Commissioner's Regulation, Section 155.5 - Item K.
- Y. Asbestos TEM: Refer to Specification Section 01050, Uniform Safety Standards for School Construction and Maintenance Projects; Commissioner's Regulation, Section 155.5 - Item L.
- Z. Lead Abatement Projects: Refer to Specification Section 01050, Uniform Safety Standards for School Construction and Maintenance Projects; Commissioner's Regulation, Section 155.5 - Item M.

1.04 CLEANING

- A. Upon completion of all work, the Contractor shall be totally responsible for general site clean up and shall provide all labor and material required to thoroughly "broom clean" the premises throughout. This cleaning shall include, but not be limited to, the removal of all surplus material from all radiators, pipes, ducts, gypsum boards, metal work, woodwork, stairs, floors, ceilings, glass and other material and surfaces, and all surfaces which are finished shall be left in a clean and suitable condition.

1.05 REMOVAL OF TEMPORARY WORKS

- A. All temporary work such as guards, shoring, staging, etc., provided or erected by the Contractor shall be removed and shall become the property of the Contractor when such temporary work is no longer required, or when directed, or at completion of the contract.

1.06 MATERIALS, LABOR, TOOLS, WORKMANSHIP

- A. The Contractor will provide and furnish at his own expense any and all material, labor, scaffolding, tools, implements, molds, models, and cartage of every description necessary or proper to or for the duty and performance of said work and the faithful execution of his contract.

1.07 ORDERING OF SPECIFIED MATERIALS

- A. All specified materials are available from the manufacturers and some items require more time for delivery to the job than others. Therefore, to avoid the necessity of last minute substitutions because of late ordering, it will be the responsibility of the General Contractor to see that items that will require a substantial waiting period before delivery are ordered soon after the Contract is awarded.

1.08 SHUT-DOWNS

- A. The Contractor shall perform the work in a manner which will minimize shut-downs of existing operating items or systems. When the performance of the work requires the shut-down of an existing operation item or system, such shut-down shall take place only after the Contractor has given at least five working days notice and has obtained written authorization for the shut-down from the Owner. All shut-downs shall take place only on overtime, at no additional cost. This provision shall apply to all work, including testing of newly installed or altered systems.

1.09 DELIVERIES AND STORAGE

- A. All deliveries of materials or equipment must be done in conjunction with the Owner's representatives, to insure the least disruption of the facility. Storage of all materials must be approved by the Owner prior to delivery. The Owner will not accept any deliveries on behalf of the Contractor. A Contractor's representative must be on site to accept such deliveries.

- B. Before attempting to deliver materials to the site, the Contractor shall inform the designated Owner's Representative so that arrangements can be made for places of entrance and inspection of materials being delivered.
- C. Storage of materials in the occupied building shall not be allowed unless otherwise agreed upon by the Owner's Representative. The Contractor shall be responsible for providing all storage trailers and security of same.

1.10 SPECIAL PROVISIONS

- A. Contractor Representation at Construction Project Meetings:
 - 1. Each Contractor shall provide qualified representation at all construction project meetings which will be held on a bi-weekly basis for the review of construction progress and coordination of all building trades. Failure of the Contractor to abide by these provisions may cause delays and incur additional expenses due to coordination difficulties.
- B. Any existing items (whether or not specified or shown on the drawings) requiring removal in order to properly complete the new work shall be removed by the Contractor performing the work and disposed of off-site at no additional charge to the Owner.
- C. Unless a specified item of removal, relocation, or installation (which appears to be in conflict with the actual site conditions) is brought to the attention of the Architect during the bidding period, the Contractor shall be responsible for the execution of said work and any related expenses incurred.
- D. Should any work or material be required which is not denoted in the Plans and Specifications, either directly or indirectly, but which is necessary for the proper execution of the intent thereof, it shall be understood and agreed that the same is implied and required and that the Contractor shall furnish all labor and material as if they were completely delineated and prescribed.
- E. Should a conflict occur between the drawings and specification and/or existing conditions, the Contractor shall be deemed to have estimated the more expensive way of accomplishing the work unless during the bidding period a clarification was requested by the Contractor and obtained in writing from the Architect, as to which method and material is to be used.
- F. Where, in these specifications, one certain kind, type, brand, or manufacture of material is named, it shall be regarded as the required minimum standard of quality and performance. Where two or more are named, these are presumed to be equal and the Contractor may select one of these items. If the Contractor desires to use any other kind, type, brand, or manufacture of material than those named in the specification, he shall submit information describing in detail where it differs from base specifications and other information as required by the Owner.

The burden of proof of equivalence rests with the bidder. Adequate supporting information must accompany proposed substitution. The Owner or Architect reserves the right to accept or reject proposed substitutes.

- G. Any item shown on the plans but not specified or conversely specified but not shown on the plans, shall be treated as if shown or mentioned respectively in both.
- H. Alignment and adjustment of all erected steel shall be accomplished by a registered professional or land surveyor at the Contractor's expense and to the satisfaction of the Inspector.
- I. Inspection of all welded and high strength bolted field connections shall be accomplished by one of the following approved independent testing laboratories or an alternate testing company acceptable by the Owner. The Contractor shall arrange for and the Owner shall pay for all testing other than testing revealing failed results:
 - 1. All Island Testing.
 - 2. Soil Mechanics Environmental Services.
 - 3. Long Island Materials Testing Laboratories, Inc.
- J. Unless otherwise noted, each Contractor shall be responsible for their own cutting and rough patching. The General Construction Contractor shall be responsible for all finish patching and painting. All repair and patching work shall be done in a professional manner. The Contractor shall take care to match new and existing surfaces and materials as closely as possible for a continuous finish where duplication is impossible.
- K. Each Contractor shall be responsible for their own material and equipment until completely installed, inspected for completeness and correctness, and signed off by the Architect or his duly appointed representative.
- L. The General Construction Contractor shall be the lead contractor, responsible for all coordination between the General Construction, Mechanical, and Electrical trades.
- M. The General Construction Contractor shall be responsible for cutting and patching all masonry work, insulated panels, etc. to accommodate any required thru-wall piping, conduit, equipment, or ductwork penetrations by other trades.
- N. The General Contractor shall be responsible for provision of any required temporary roof drainage, protective fencing, plywood enclosure of all window and door masonry openings, etc., until new construction or material is permanently and completely in place.
- O. The General Contractor shall provide and install all flashing, counterflashing, and pitch pockets for all roof equipment and roof penetrations and install all required roof curbs provided by others in accordance with the manufacturer's approved methods.

P. Changes to the Contract:

1. Should any changes be requested or required over and above the original contract scope, the Contractor shall be compensated as follows:
 - a. For the actual and reasonable net costs for all materials and wages of applied labor required for such extra work.
 - b. Rental costs for all machinery and equipment (other than small tools) required and approved for such extra work.
 - c. 10% overhead and 5% profit as compensation for all other items of profit and cost or expense, including administration, overhead, supervision, etc. (Contractor is limited to 5% overhead for work performed by his subcontractor on changes.)
 - d. A maximum of 2% for any increase in bonds and insurance's due to the adjusted contract sum.

Q. As is usual with capital project payments, the District will retain 5 percent of each payment issued on verified requisitions for payment submitted by the Contractor. This retainage total will be paid upon satisfactory completion of all work.

R. Contractor's proposals for any additional work (whether a field condition or program change) shall be submitted for consideration as follows:

1. Labor - Number of men
Wage per hours
Number of hours
2. Material - Unit costs (no lump sums)
Unit measure (l.f., s.f., cu.ft., etc.)
3. Rental costs for machine, equipment, driver, etc.
4. 2% for bonds and insurance.
5. Upon request, the Contractor shall furnish satisfactory proof of all labor performed, materials furnished, and equipment used in performance of the extra work.

S. Whenever inclement weather (rain, hail, sleet, snow, etc.) causes an interruption in the day to day execution of the Contract work, each Contractor must fully mobilize their forces (with the necessary manpower and equipment) to immediately continue with Contract operations the very first day that such weather has subsided.

1. Contractor shall provide all necessary excavation and dewatering equipment to remove any standing water from open holes, ditches, trenches, and other excavations.

- T. The maximum gross weight of vehicles used shall not exceed 2,500 lbs. per wheel in the area of any playground or ballfields. The equipment shall be fitted with flotation type tires. On lawns, the pounds per square inch exerted on the turf-grass shall not exceed 15 lbs. per square inch and on athletic areas shall not exceed 32 pounds per square inch.
- U. See attached "Record of Unacceptable or Non-Conforming Work".

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01050 - UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND MAINTENANCE PROJECTS; COMMISSIONER'S REGULATIONS, SECTION 155.5

PART 1 - GENERAL

1. Certificate of Occupancy Statement: The existing building will be occupied during construction. Throughout the duration of construction the contractor shall maintain the integrity of the existing structure. The occupied portion of any school building and required exits shall always comply with the minimum requirements necessary to maintain a certificate of occupancy.
2. Asbestos / Lead / Polychlorinated Biphenyls Test Letter: All existing school areas to be disturbed during renovation or demolition (existing facilities building envelope components, interior finishes and concealed utility infrastructure) have been tested for lead, asbestos and Polychlorinated Biphenyls containing materials in accordance with OSHA, EPA, DEC and DOH requirements. Material test results are provided within the Project Manual. If negative for asbestos, Item 10 below does not apply. If negative for Lead, Item 11 below does not apply. If negative for Polychlorinated Biphenyls (PCB) item 12 does not apply.
3. Safety and Security Standards for Construction Projects: Throughout the duration of this construction project, the following general safety and security standards shall be maintained by all Contractors on site:
 - a. All construction materials shall be delivered during the times as stipulated by the School District. All materials shall be stored in a safe and secure manner. Locations for on-site storage shall be coordinated with the Owner's Representative.
 - b. Temporary construction fencing shall be erected around construction activity areas in accordance with Specification Section 01500. When indicated in the drawings, construction fencing will be shown on the Construction Implementation Plans. All fencing around construction activity areas shall be maintained to restrict unauthorized access and prevent students from entering site. Fencing around construction supplies or debris shall be maintained.
 - c. Gates securing construction activity areas shall be secured and locked at all times unless manned by contractor personnel to prevent unauthorized access. Signs stating "Caution - Construction Activity Area Construction Personnel Only, Unauthorized Access Prohibited" shall be posted at all entry points and 75' intervals along security fence.
 - d. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and designated with warning signs to prevent entry.
 - e. Worker Photo Identification: Workers shall be required to wear photo identification badges at all times for identification and security purposes while working at occupied sites.
4. Separation of Construction Areas from Occupied Spaces: Construction areas which are under the control of a Contractor and therefore not occupied by District staff or students shall be separated from occupied areas by means of temporary construction barriers.

Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building in accordance with Specification Section 01500. Periodic inspection and repairs of the containment barriers must be made to prevent dust or contaminants from entering occupied areas. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy-duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.

- a. A specific stairwell and/or elevator shall be assigned for construction worker use during working hours. In general, workers may not use corridors, stairs, or elevators designated for students or staff use.
 - b. Contractors shall remove large amounts of construction debris and rubbish from the building using enclosed chutes or other similar sealed system to contain dust and other particulate. No material shall be dropped or thrown outside the walls of the building. Removal of construction debris and rubbish shall be through construction areas only, there shall be no movement of debris through halls of occupied spaces of the building.
 - c. Dust and debris generated by construction activities in occupied parts of the building shall be cleaned by the Contractor at the close of each workday in accordance the General Requirements of Division 1, Section 1B and Specification Section 01015. The Contractor is responsible to maintain all health, safety, public address systems and educational capabilities of occupied areas within the school building at all times that classes are in session.
5. Exiting Plan: A plan showing how exits required by NYS Building Code will be maintained. This is typically shown within CIP and/or Code Compliance Plans.
 6. Ventilation During Construction: A plan showing how required ventilation will be maintained during construction. This is typically shown within CIP and/or Code Compliance Plans.
 7. Construction Noise: Construction and maintenance operations shall not produce noise in excess of 60 DBA in occupied spaces, or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical treatments shall be placed so as to abate the excessive noise levels. Acoustic treatments shall be prescribed by the Architect and supplied and installed by the Contractor.
 8. Construction Fume Control: The Contractor shall be responsible for the control of chemical fumes, gasses and other contaminants produced by welding, gasoline or diesel engines, roofing, paving, painting, etc., to ensure they do not enter occupied portions of the building or air intakes.
 9. Off-Gassing Control: The Contractor shall be responsible for ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured, or ventilated in accordance with manufacturer's recommendations before a space can be occupied.
 10. Asbestos Code Rule 56 Compliance: Where so indicated by positive test results, portions of the project may entail the removal of asbestos containing material as defined by 12NYCRR56. Large and small asbestos abatement projects (as defined by 8 NYCRR 155.5(k)) shall not be performed while the building is occupied. (Definition of "building", as referenced in this section, means a wing or major section of a building

that can be completely isolated from the rest of the building with sealed non-combustible construction.) The isolated portions (the occupied portion and the portion under construction) of the building must contain separate code compliant exits. The ventilation systems must be physically separated and sealed at the isolation barrier(s).

Removal of asbestos containing material shall only be performed when the building, as defined above, is unoccupied. The Contractor shall verify that the building has been vacated prior to commencing asbestos abatement work. If the building is configured such that the affected area can be completely isolated from the unaffected areas with sealed non-combustible construction barriers, then the unaffected areas can remain occupied provided required exits are maintained independently in both areas.

Removal of asbestos containing materials on the exterior of the building such as flashing, roofing, siding or soffit and caulking may be performed on occupied buildings provided all variances have been granted and the occupants have been notified of the intention to remove asbestos containing material. Complete isolation of ventilation systems supplying the occupied spaces and windows must be maintained throughout the removal duration.

Asbestos TEM: Where so indicated by positive test results, the asbestos abatement area shall be completely sealed off from the rest of the building and completely cleaned and tested by TEM prior to re-entry by the public.

11. Lead Abatement Projects: At interior painted surfaces which have tested Positive for Lead: Portions of walls that will be disturbed as a requirement of this contract shall be removed in accordance with the Lead Safety Plan included within the Project Manual. This section clearly references OSHA regulations to be followed, and clean-up and testing associated with lead abatement must be done in strict conformance with HUD protocol. Locations where construction activity requires the removal of lead containing materials shall be completely isolated from occupied portions of the building using a construction barrier. The Contractor shall have all surrounding areas tested for lead levels prior to commencing work and after work has been completed to ensure that surrounding areas have not been contaminated by removals.
12. PCB Projects: Any window caulking tested and found to contain PCBs must be removed in accordance with U.S. EPA regulations under the Toxic Substances Control Act (40 CFR 761.62). Soil areas adjacent to windows containing PCBs must follow the 40 CFR 761.62 criteria. A site-specific abatement plan must be developed to address potential environmental and public health concerns. Steps for abating contamination and preventing contamination of nearby areas must be done in accordance with HUD Technical Guidelines for the Evaluating and Control of Lead Based Paint Hazards in Housing.
Removal of PCB containing materials on the exterior of the building such as caulking may be performed on occupied buildings provided all variances have been granted and the occupants have been notified of the intention to remove PCB containing material. Complete isolation of ventilation systems supplying the occupied spaces and windows must be maintained throughout the removal duration.
13. Fire Prevention: Any holes in floors or walls shall be sealed with a fire-resistant material whose rating meets or exceeds that of the construction to which it is attached.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01070 - ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section lists and defines various common abbreviations which are used throughout the Contract Documents.
- B. Abbreviations of organizations and federal agencies which publish standards, codes, and regulations are defined in section 01060 - CODES AND STANDARDS.
- C. Other abbreviations and symbols may be found in legends and elsewhere on the Drawings. Piping material abbreviations are contained in the piping sections.
- D. Should an abbreviation or symbol not be specifically defined, it shall carry the standard definition commonly used in the industry.
- E. Whenever any doubt arises as to what an abbreviation or symbol means, notify Engineer and he will issue a definition in writing.

1.02 ABBREVIATIONS

- A. The following is a list of commonly used abbreviations which may be found in the Contract Documents, and the meanings ascribed to them:

A.C. or ac	Alternating Current
a or A	Amperes
AFF	Above Finished Floor
amp or Amp	Amperes
Alum.	Aluminum
Asph.	Asphalt
AWG.	American Wire Gauge
Aux.	Auxiliary
Bit. Conc.	Bituminous Concrete
CB	Circuit Breaker
Cl.	Class
cm	Centimeter
C.O.	Clean out
Conc.	Concrete
Cont.	Continuous
Cu.	Cubic
cc	Cubic Centimeters
C.F.	Cubic Feet
CFM or cfm	Cubic Feet Per Minute
CFS or cfs	Cubic Feet Per Second
C.Y.	Cubic Yards
CT	Current Transformer
D.C. or dc	Direct Current
DFT.	Dry Film Thickness
Dia.	Diameter
DWG. or Dwg.	Drawing
Dr.	Drive
Ea. or ea.	Each

EF	Each Face
EW	Each Way
Eff. or eff.	Efficiency
El. or Elev.	Elevation
Fin. Gr.	Finished Grade
fps	Feet Per Second
Ft. or ft.	Feet
ftg.	Footing
g.	Grams
Ga. or ga.	Gauge
Gal. or gal.	Gallon
Galv.	Galvanized
GPD or gpd	Gallons Per Day
GPM or gpm	Gallons Per Minute
H-O-A	Hand-off-automatic
Hz. or hz	Hertz
I.D.	Inside Diameter
Inv.	Invert
KVA or kva	Kilovolts-amperes
Kw or kw	Kilowatts
kwh or KWH	Kilowatt-hours
Lbs. or lbs.	Pounds
L.F.	Linear Feet
LPA	Lighting Panel "A"
L.S.	Lump Sum
m.	Meters
mA	Milliamperes
Max. or max.	Maximum
MCC	Motor Control Center
mg.	Milligrams
MGD or mgd	Million Gallons Per Day
mi.	Miles
Min. or min	Minimum
mm	Millimeters
No. or no.	Number
nom.	Nominal
N.T.S.	Not To Scale
O.D.	Outside Diameter
O & M	Operations and maintenance
Oz. or oz.	Ounce
pb	Pushbutton
PPD	Pounds Per Day
P/B	Pullbox
pri.	Primary
psf	Pounds Per Square Foot
psi	Pounds Per Square Inch,
psig	Pounds Per Square Inch, Gauge Pressure
PT	Potential Transformer
Pvt. or Pvmt.	Pavement
R.	Radius
R.O.W.	Right-of-Way
Sch.	Schedule
sec.	Secondary or Seconds
S.F.	Square Feet
S/S/P/	Stop-start-pilot Station
Std. or std.	Standard
S.Y.	Square Yards
T&B	Top and Bottom
Typ.	Typical

U.O.N.	Unless Otherwise Noted
U.V.	Ultraviolet
V or v	Volts
Vac or VAC	Alternating current Voltage
Vdc or VDC	Direct Current Voltage
V.F.	Vertical Feet
Vol.	Volume
W or w	Watts
Yd. or yd.	Yards

1.03 SYMBOLS

- A. The following is a list of commonly used symbols which may be found in the Contract Documents, and the meanings ascribed to them:

P	Phase, Diameter, or Round (as applicable)
D	Degrees (F. = Fahrenheit C. = Centigrade)
'	Feet or Minutes
"	Inches or Seconds
#	Number or Pound
/	Per or Divided by

PART 2 - EXECUTION

(NOT UTILIZED)

PART 3 - EXECUTION

(NOT UTILIZED)

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01085 - APPLICABLE STANDARDS

PART ONE - GENERAL

1.01 GENERAL:

A. Work included:

1. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and type of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
2. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is the Contractor's responsibility to provide materials and workmanship, which meet or exceed the specifically named code or standard.
3. It is also the Contractor's responsibility, when so required by the Contract Documents or by written request from the Architect, to deliver to the Architect all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested in writing by the Architect, and generally will be required to be copies of a certified report of tests conducted by a testing agency approved for that purpose by the Architect.

1.02 QUALITY ASSURANCE:

- A. Familiarity with pertinent codes and standards: In procuring all items used in this work, it is the Contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for use in this work meet or exceed the specified requirements.
- B. Rejection of non-complying items: The Architect reserves the right to reject items incorporated into the Work, which fail to meet the specified minimum requirements. The Architect further reserves the right, and without prejudice to other recourse the Architect may take, to accept non-complying items subject to an adjustment in the Contract Amount as approved by the Architect and the Owner.
- C. Applicable standards listed in these Specifications include, but not necessarily limited to, standards promulgated by the following agencies and organizations:
1. AASHTO: American Association of State Highway and Transportation Officials, 342 National Press Building, Washington, D.C. 20004.
 2. ACI: American Concrete Institute, Box 19150, Redford Station, Detroit, MI 48129.
 3. AISC: American Institute of Steel Construction, Inc., 1221 Avenue of the Americas, New York, NY 10020.

4. ANSI: American national Standards Institute (successor to USASI and ASA), 1430 Broadway, New York, NY 10018.
5. ASTM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.
6. AWS: American Welding Society, Inc., 2501 N. W. 7th Street, Miami, FL 33125.
7. AWWA: American Water Works Association, Inc., 6666 West Quincy Avenue, Denver, CO 80235.
8. CRSI: Concrete Reinforcing Steel Institute, 228 North LaSalle Street, Chicago, IL 60610.
9. CS: Commercial Standard of NBS, J.S., Department of Commerce Government Printing Office, Washington, D.C. 20402.
10. DHHS: Department of Health and Human Services, 26 Federal Plaza, New York, NY 10007 (212) 264-2560
11. EPA: Environmental Protection Agency Region II, 26 Federal Plaza, NY, NY 10007 Asbestos Coordinator - Room 802 (212) 264-7307

Part 61, Sub-Part M
National Air Emissions Standards for Hazardous
Air Pollutants (NESHAP)
40 CFR Part 763, Subpart E
Asbestos Hazard Emergency Response Act (AHERA)

12. FED. SPECS.: Specifications Sales (3F21) Bldg. 197, Washington Navy Yard, GS, Washington, DE 20407
13. FGMA: Flat Glass Marketing Association, 3310
14. NAAMM: National Association of Architectural Metal Manufacturers, 1033 South Boulevard, Oak Park, IL 60302.
15. NEC: National Electrical Code (see NFPA).
16. NEMA: National Electrical Manufacturers Association, 155 East 44th Street, New York, NY 10017.
17. NFPA: National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
18. NIOSH: National Institute for Occupational Safety and Health, 26 Federal Plaza, New York, NY 10007, (212) 264-2485
19. OSHA: Occupational Safety/Health Administration, New York Regional Office, 1515 Broadway, NY, NY 10036, Room 3445 (212) 944-3426
20. SDI: Steel Deck Institute, 135 Addison Avenue, Elmhurst, IL 60125.
21. SED/SLD: State Education Department and State Labor Department
22. SSPC: Steel Structures Painting Council, 4400 5th Avenue, Pittsburgh, PA 15213.

23. TCA: Tile Council of America, Inc., P. O. Box 326, Princeton, NJ 08540.
24. UL: Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, IL 60611.
25. Fed Specs and Fed Standards: Specifications Sales (3FRI), Bldg. 197, Washington Navy Yard, General Services Administration, Washington, D.C. 20407.
26. MIL-SPECS: Military Specifications, Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402.
27. UBC: Uniform Building Code, International Conference of Building Officials, 5360 South Workman Mill Road, Whittier, CA 90601.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01230 - CONSTRUCTION PHASE CLARIFICATIONS -
REQUESTS FOR INFORMATION FROM ARCHITECT'S OFFICE

PART 1 - GENERAL

1.01 SUBMISSION OF ARCHITECT'S RFI FORM:

A. In addition to the requirements of General Conditions, Articles 1.1.10, 1.1.11, 1.26, 3.12, 4.2, 4.3, 4.4, 7.1, 7.2, 7.3, 7.4, 7.5 and 13.4 (and all other Articles as deemed applicable by the Architect), each Prime Contractor shall comply with the following wherever it applies to the work of his contract:

1. Each Prime Contractor shall prepare and submit, on the Architect's attached form (see last page of this specification section), an original Request For Information (RFI) to Architect's Office, for all questions which may arise during post-bid award activities which are to be directed to the office of the Architect. This form shall be submitted before commencement of any work, which may be in question. (Commencement of work in question shall constitute complete acceptance of field conditions and necessary remedial repairs as directed by the Architect, and work shall be conducted at no additional charges to the Owner.) The RFI form shall indicate, at the bare minimum, the following information:

- a. Date of Request and RFI number.
- b. Project Name and Project Number: reflecting title sheet information, including SED number.
- c. Attention of: Name of Architect in Charge/Project Director/Project Manager.
- d. From: Name of submitting Prime Contractor representative, including his project title, office or field office phone number, and fax number.
- e. Trade: The Prime Contract, which is being represented.
- f. Date Information Required By: Fill in exact date information is required. "ASAP" or "IMMEDIATELY" will not be acknowledged by the Architect's office.
- g. Detailed description of requested item.

2. Note to all Prime Contractors: Request For Information forms shall be used for requests, clarifications, or questions on contract drawings and specifications, **not** contract terms, scheduling items, or general correspondence, or as a means to describe or request approval of alternate construction means and methods, concepts, substitutions, materials, or systems. *Each individual Prime Contractor is to fill out the Architect's RFI form completely (leaving no blanks) and send them DIRECTLY via fax to the Architect's Office, with a concurrent copy to the Construction Manager's office.* Neither the Architect nor the Construction Manager will be filling out these forms on

your behalf, but they will be working with each other and the Owner to answer such RFIs. Incomplete RFI forms will not be logged in, and will be discarded. *It shall not be the Architect's responsibility to contact any Prime Contractor submitting RFIs to verify their completeness or accuracy.*

- B. RFI Log: Each Prime Contractor shall be responsible to generate an RFI log, to be updated and submitted weekly to the Architect and the Construction Manager. Examples of acceptable log format can be obtained from the office of the Construction Manager. Log shall include, at bare minimum, the following items:
- a. Date of submittal to Architect's office, and method of transmittal.
 - b. Date of response from Architect's office.
 - c. If not yet responded to, number of days since submittal.
 - d. In Prime Contractor's opinion, list of affected trades impacted by the results.

1.02 LIMITATIONS:

- A. Requests for information shall be made in full accordance with A.I.A. Standard Document B141-1997 (Standard Form of Agreement Between Owner and Architect), Article 2.6, Contract Administration Services, Items 2.6.1.5, 2.6.1.6, and 2.6.1.7. The Architect agrees to the following actions with regard to "Requests For Information" which are received by his office:
1. The Architect shall review properly prepared, timely requests by the Contractor for additional information about the contract documents. A properly prepared Request for Additional Information about the Contract Documents shall be in a form prepared or approved by the Architect, and shall include a detailed written statement that indicates the specific drawings or specifications in need of clarification and the nature of the clarification requested (A.I.A. B-141-2.6.1.5).
 2. If deemed appropriate by the Architect, the Architect shall, on the Owner's behalf, prepare, reproduce, and distribute supplemental drawings and specifications in response to Request For Information by the Contractor (A.I.A. B-141-2.6.1.6).
 3. The Architect shall interpret and decide matters concerning performance of the Owner and Contractor under, and requirements of, the contract documents on written request of either the Owner or Contractor. The Architect's response to such requests shall be made in writing within any time limits agreed upon or otherwise with reasonable promptness (A.I.A. B-141-2.6.1.7).

4. Based upon the amount of RFIs received, and their content, unless otherwise so indicated on the RFI, the Architect shall establish the level of importance of said RFIs, and shall be allowed sufficient time in the Architect's professional judgement to permit adequate review. Prior to submitting any RFIs, each Prime Contractor shall use their individual discretion in determining whether or not an RFI format or verbal format be used to resolve said situation.
5. In the event of multiple sequential RFIs received same day at the Architect's office, *unless they are specifically numbered by the Prime Contractor for their order of relative importance*, they will be reviewed either: a) in the time order in which they were received by the Architect's office, b) in their natural progressive order of construction placement, or c) in order of preference, as determined by the Architect.
6. As a result of multiple sequential RFI submission, no delays in time, or Prime Contractor hard or soft costs shall be implied or imposed onto the Architect. It is the Prime Contractor's complete responsibility to adhere to the prepared Construction Schedule at all costs, including extended delays, which may be incurred by time required for RFI responses from the Architect's office.
7. Should an answer be required 'immediately', the Prime Contractor shall simply place an asterisk by the date required to call attention to such a fact. He shall coordinate his own work forces accordingly to allow the Architect proper review and analysis time for resolution of such 'immediate' problems.
8. *It shall be the Prime Contractor's complete responsibility to document any verbal responses, into either follow-up RFI submittals or formal letters (on company logo stationery) to the Architect's office. Upon receipt, the Architect will review and make modifications to the correspondence if it varies in content from the Architect's interpretation. This will eliminate confusion or misunderstandings made in verbal form.*
9. The Architect shall be the sole interpreter of all RFI validity, as the RFI is based on products of service produced by the Architect's office. The Architect reserves the right to reject any and all RFIs deemed frivolous or trivial.
10. As work in question is directed to the Architect for his sole response, only the attached Architect's RFI form will be considered as final and binding.

1.03 LOG-IN PROCEDURE FOR ALL RFI REQUESTS

- A. Log-in procedures are based on the normal business hours of the Architect's office, and **will not be modified for any reason**. The Architect's normal business hours are 8:00 a.m. to 5:00 p.m., EST, Monday through Friday. **All RFIs shall be reviewed by the Architect's office during normal business hours.** The Architect's office is closed on the following legal holidays: New Year's Day, President's Day, Memorial Day, Labor Day, Thanksgiving Day and the day following, and Christmas Day. **Under no circumstances shall the**

Architect's office be considered or assumed as open for business on Saturdays, Sundays, or legal holidays.

- B. Any RFIs, which are received between 8:00 a.m. and 2:59:59 p.m. on a normal business day, will be received and logged in as received on that business day. Any RFIs, which are received and logged in by the Architect's Office at 3:00 p.m. or later (Eastern Standard Time) on a normal business day shall be considered as received at 8:00 a.m. the following business day. Any RFIs received by the Architect's office at or after 3:00 p.m. on Fridays will be logged in as received at 8:00 a.m. on the next following business day (Monday). In the case of the following calendar day being a holiday, the RFI shall be considered as received on the next non-holiday business day at 8:00 a.m. **All receipt times shall be as determined by the received time stamped and signed in by the Architect's office.**

1.04 PROPER SEQUENCING OF RFI SUBMISSIONS

- A. It is the Prime Contractor's sole responsibility to fully coordinate submission of RFI forms with shop drawing and technical data submittals made or yet to be made. The Prime Contractor must coordinate each RFI with requirements of work and the contract documents.
- B. The Prime Contractor's responsibility for deviations in submissions from requirements of contract documents is not relieved by Architect/Engineer's review of RFIs or associated submissions, unless the Architect gives written acceptance of specific deviations.
- C. The Prime Contractor's responsibility for errors and omissions in submissions or RFIs is not relieved by the Architect's review of submissions or RFIs.
- D. In conformance with Section 01300 - Submissions, notify the Architect in writing at time of shop drawing/technical data submission of deviations in submissions from requirements of contract documents. Do not wait until RFI is prepared to inform the Architect's office of planned deviations.
- E. Similar to Section 01300 - Submissions, no portion of the work requiring RFI clarifications shall be started, fabricated, or installed until return of Architect's formal response, including any supplemental information the Architect deems relevant for clarification.
- F. After response to RFI, the affected Prime Contractor shall distribute copies of the RFI responses to all parties requiring same for coordinating all subsequent work. The Architect's only responsibility shall be to supply one copy of each RFI resolution to: the Construction Manager, the Owner, and the affected Prime Contractor who initiated the RFI.
- G. The affected Prime Contractor shall make required copies of all RFI resolutions for distribution to all affected parties immediately upon receipt and review of same.

1.05 AFFECT OF RFI RESPONSES ON THE PRIME CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. All Prime Contractors shall note well that the Architect is not legally bound to their approved construction schedules; the Prime Contractors are the only parties legally bound therein. The Architect is not required to expedite any reviews or comments in the effort to expedite the Prime Contractors' submission and/or construction schedules. Therefore, time delays created by the Architect's required review time of each RFI shall be absorbed into the Prime Contractor's work schedule accordingly. This may necessitate such Prime Contractor measures as: multiple work crews, off-hour or weekend construction by the affected Prime Contractor(s), to be completed at no additional costs to the Owner. For this reason, it is imperative that each Prime Contractor carefully review all documents as early as possible, in order to issue RFIs by the earliest possible date.
- B. Any RFIs which are relative to an alteration, to the approved contractual details, or specifications will be specifically referred to the Architect's office with relative time differences noted. Any additional time required for alterations, if RFIs are approved, shall have all additional costs (if any) absorbed directly by the Prime Contractor affected. ***Should other Prime Contractors be directly affected in either labor, material, or equipment costs, their additional costs shall be borne by the Prime Contractor who initiated the RFI.***

1.06 AFFECT OF RFI FORMS ON CONTRACTOR PREPARATION, AND PREPARATION OF SHOP DRAWINGS, SAMPLES, MANUFACTURER'S DATA, ETC.

- A. It is the responsibility of the Contractor furnishing and/or installing materials and/or systems to these projects to field verify all existing and/or as-built conditions, as well as all conditions presently under construction that are interrelated in whole or in part to the furnishing and/or installing of such materials and/or systems. Submissions of RFI forms are at the sole discretion of each Prime Contractor.
- B. It is the responsibility of each Prime Contractor to coordinate such field verification and be ultimately responsible for the accuracy of same prior to the submission of any RFI forms or shop drawings for design intent review by the Architect/Engineer.
- C. Similar to submittal information indicated in Section 01300 - Submissions, all RFIs initiated by any subcontractor and/or supplier of the Prime Contractor and/or supplier of the Prime Contractor or by the Prime Contractor themselves shall be reviewed by and shall be deemed officially submitted by the Prime Contractor. All RFIs shall be thoroughly checked by the Prime Contractor prior to the submission of same to the Architect's office for: contract document accuracy, validity and/or equivalency (if applicable); total quantity of material provided; all dimensioning systems related; alteration to same if necessary to accommodate accepted field changes built or pending; interaction with other materials and/or systems furnished and/or installed by this Prime Contractor or their subcontractors (i.e., field measurements for space allocation, accuracy to previous submittals of this Prime Contractor, etc.); and interaction with materials and/or systems provided by other Prime Contractors.

- D. After the completion of applicable RFIs, when submitting subsequent revised technical data or revised shop drawings, the Prime Contractor shall signify same on subsequent submittal by having the following information on each and every submittal:
- ☐ Name of Prime Contractor
 - ☐ Date of Review by Prime Contractor
 - ☐ Note: This submittal has been reviewed by (Name of Prime Contractor) in accordance with the contract documents describing and defining the requirements of such review, with affected RFI number attached.
 - ☐ Copy of approved RFI, indicating Architect's final comments.
 - ☐ Signature of Prime Contractor's reviewer.
 - ☐ Name of Prime Contractor's reviewer (printed).
 - ☐ Title of Prime Contractor's reviewer (printed).
- E. The Prime Contractor shall submit in writing to the Architect and Construction Manager, prior to their relevant revised or initial submissions, the name and title of the reviewer who shall be an employee of the Prime Contractor for review and acknowledgment of same, along with the recommended RFI from the Architect's office.
- F. As this project has a Construction Manager who is acting on the Owner's behalf and who has full-time construction site representation, the scheduling of all RFIs, submissions, the coordination, and interaction of other prime contractors, field conditions that affect the submission of, fabrication of, or installation of another Prime Contractor's submission, fabrication, or installation shall be made known to the Owner's Representative. Refer to Section 01300 - Submissions for additional relevant information.
- G. Any resultant construction field condition that arises that is contrary to an RFI or submission made, that is conflicting with another Prime Contractor's submission, the schedule for construction, or with another Prime Contractor's constructed work shall be immediately identified by the Prime Contractor(s) and made known to the Owner's Representative. If such condition causes any construction schedule delay, "rereview" by the Architect/Engineer, additional work of the Architect/Engineer (such as field review, "redesign" or document preparation); or "reconstruction" of any work already built and/or accomplished by another Prime Contractor, the connection to such conditions (and any associated costs to accomplish same) shall be the sole responsibility of the Prime Contractor found negligent in causing such conditions.
- H. Any RFI not containing complete information outlined and required as indicated within the above subsections will not be reviewed by the Architect for design intent, but rather rejected and discarded, so all Prime Contractors must insure that no blanks are left on their submitted RFIs. All time lost as a result of this error will be the sole responsibility of the Prime Contractor who made the error.
- I. Any RFI submitted by the Prime Contractor that requires subsequent coordination with another material and/or system provided by this Prime Contractor or another Prime Contractor that has been reviewed, by that Prime Contractor and previously submitted to the Architect may be rejected in whole or part by the Architect, or held in abeyance by same until the corresponding and coordinating submittals are submitted as the concurrent review of all such submittals for design intent, may be deemed important by the Architect. Any

release given any entity other than the Architect to fabricate, furnish, and install any material or system not reviewed by the Architect for design intent shall become the sole responsibility of the releasing entity as well as the resolution of construction related issues or conflicts, relative to approved or disapproved RFIs.

- J. In addition, the Prime Contractor shall not utilize nor refer to any schedule of work not created nor provided by the Architect. The Prime Contractor's method in establishing, defining, and/or substantiating their ability to maintain the schedule presented in these contract documents and as prepared by the Owner's representative shall be exclusive of a defined time period of submittal review, and shall not be dependent upon RFI approval or time delays incurred.
- K. Similar to Item 1.03L of Section 01300 - Submissions, the rejection or abeyance noted in the above subparagraph shall not be considered a delay or a reason for an extension of time in the construction schedule to the contract, as such cause for same shall have been brought upon by the Prime Contractor not providing the "pre-coordination" necessary for such submissions.

PART TWO - PRODUCTS

Not Applicable.

PART THREE - EXECUTION

Not Applicable.

END OF SECTION

BBS Architects, Landscape Architects, & Engineer, P.C.
244 East Main Street
Patchogue, New York 11772

Phone: (631) 475-0349
Fax: (631) 475-0361

REQUEST FOR INFORMATION

RFI NO: _____

DATE: / /

PROJECT:

PROJ. NO:

LOCATION:

TO THE ATTENTION OF:

FROM:

PHONE:

FAX:

TRADE:

DATE INFORMATION REQUIRED BY:

REQUEST:

Spec Section: Description:

REPLY:

BY:

FIRM:

DATE:

If a "Request for Information" is deemed relevant and appropriate by the Architect, the Architect's response to such requests shall be made in writing within any time limits agreed upon or otherwise with reasonable promptness. Upon evaluation of the Prime Contractor's request and if deemed necessary, the Architect's response may include supplemental drawings and specifications.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01300 - SUBMISSIONS

PART 1 - GENERAL

1.01 SHOP DRAWINGS, PRODUCT DATA, MANUFACTURER'S WARRANTIES, AND SAMPLES:

- A. In addition to the requirements of General Conditions, Article 3.12, each Prime Contractor shall comply with the following wherever it applies to the work of his contract:
1. Prepare and submit, with construction schedule, a separate schedule for shop drawings, product data, and samples submittals, which shall be herein referred to as a "Submittal Log". This log shall list all required submittals specific to your trade as detailed in the various sections of the Project Specifications. Submittal log shall be submitted within one (1) calendar week of Notice to Proceed, before submitting first payment application. Submittal log shall show the following:
 - a. Section number.
 - b. Item of shop drawing, product data, and samples.
 - c. Date to be submitted.
 2. Shop drawings: Original drawing, prepared by Prime Contractor, subcontractor, supplier, or distributor, which illustrates some portion of the work; showing fabrication, layout, setting or erection details.
 - a. Identify details by reference to sheet and detail numbers shown on contract drawings.
 - b. Sheet size, multiple of 8-1/2" x 11", not to exceed size of contract drawings when unfolded.
 - c. Reproductions for submittals: One (1) reproducible transparency with seven (7) opaque diazo prints.
 - d. Photographic reproductions of contract drawings will not be accepted as shop drawings and will be rejected.
 3. Product Data:
 - a. Manufacturer's standard schematic drawings:
 1. Modify drawings to delete information which is not applicable.
 2. Supplement standard to provide additional information applicable to the project.
 - b. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.
 1. Clearly mark each copy to identify applicable materials products, or models.

2. Show dimensions and clearances required.
3. Show performance characteristics and capacities.
- c. Latest edition of manufacturer's applicable instructions and recommendations for installation of product.
4. Manufacturer's Warranties:
 - a. The Contractor shall include in his submissions samples of all manufacturer's warranties indicating the correct time duration of the warranty as specified in the contract documents. If the documents do not specify a specific time duration, the manufacturer's standard time duration shall apply, but in no event shall it be less than the contractor's guarantee as specified in Section 01700.
5. Samples: Physical examples to illustrate materials, equipment, or workmanship, and to establish standards by which completed work is judged.
 - a. Office samples to be sufficient size and quantity to clearly illustrate:
 1. Functional characteristics of product or material, with related parts and method of attachment.
 2. Full range of color samples.
 - b. Field samples and mock-ups, as specified in technical sections.
 1. Erect on project site at location acceptable to Architect/Engineer.
 2. Construct samples or mock-up complete, including work of all trades required in finish work.
6. The Architect refers to A.I.A. Document B141-1997, *Standard Form of Agreement Between Owner and Architect*, and has based the submittals procedure on said document.

1.02 PRIME CONTRACTOR RESPONSIBILITIES:

- A. All submissions are to be made directly to the Architect's office. Each Prime Contractor shall completely review, stamp, and sign his shop drawings, product data, and samples prior to submission to Architect. The Architect will not review any shop drawings unless first reviewed by Prime Contractor. Refer to 1.04G "Concurrent Submittals" for copies to be forwarded concurrently to the Construction Manager.
- B. Verify:
 1. Field measurements.
 2. Field construction criteria.
 3. Catalog numbers and other data.

- C. Coordinate each submission with requirements of work and contract documents. Prime Contractor shall exercise professional judgement to adequately address time gaps between submissions, Architect's/Engineer's review time, resubmission time, fabrication, procurement and long-lead purchases, and on-site priorities which dictate installation times.
- D. Each Prime Contractor will be responsible to send all shop drawings and technical submittals to the Architect's office via Federal Express Overnight Priority Delivery, or other comparable delivery services.
- E. Each Prime Contractor is responsible to supply the proper number of copies for all submissions, including samples, color boards, etc. The Architect has the right to reject and return any submissions made which do not conform to the requirements indicated herein.
- F. Prime Contractor's responsibility for errors and omissions in submissions is not relieved by Architect/Engineer's review of submissions.
- G. Prime Contractor's responsibility for deviations in submissions from requirements of contract documents is not relieved by Architect/Engineer's review of submissions unless Architect/Engineer gives written acceptance of specific deviations.
- H. All submissions shall be accompanied by a **Letter of Transmittal**, signed by the Prime Contractor's project manager. Notify Architect/Engineer, in writing at time of submission of deviations in submissions from requirements of contract documents. In addition, all submittals shall be accompanied by a signed and dated "**Submittal Cover Sheet**" for each item, which acknowledges the Prime Contractors review for completeness, correctness and accuracy of each submitted item.
- I. No portion of the work requiring submissions shall be started, fabricated, or installed until return of approved submissions to the prime contractor.
- J. After Architect review, distribute copies of submissions to parties requiring same for coordinating of work.
- K. Make required copies for distribution of shop drawings, and product data, that has been stamped and signed by the Architect.

1.03 CONTRACTOR PREPARATION, REVIEW, AND SUBMISSION OF SHOP DRAWINGS, SAMPLES, MANUFACTURER'S DATA, ETC.

- A. It is the responsibility of the Contractor furnishing and/or installing materials and/or systems to these projects to field verify all existing and/or as-built conditions, as well as all conditions presently under construction that are interrelated in whole or in part to the furnishing and/or installing of such materials and/or systems.
- B. It is the responsibility of the Prime Contractor, to coordinate such field verification and be ultimately responsible for the accuracy of same prior to the submission of shop drawings for design intent review by the Architect/Engineer.

- C. All submittals of shop drawings, materials, samples, etc. prepared by any subcontractor and/or supplier of the Prime Contractor or by the Prime Contractor themselves shall be reviewed by the Prime Contractor, prior to the submission of same to the Architect/Engineer, for: contract document accuracy and equivalency (if applicable); total quantity of material provided; all dimensioning systems related; alteration to same if necessary to accommodate accepted field changes built or pending; interaction with other materials and/or systems furnished and/or installed by this Prime Contractor or their subcontractors (i.e., field measurements for space allocation, accuracy to previous submittals of this Prime Contractor, etc.); and interaction with materials and/or systems provided by other Prime Contractors.
- D. After the completion of such review as stated in 1.03C above, the Prime Contractor shall signify same by having the following information on each and every submittal:
- Name of Prime Contractor
 - Date of Review by Prime Contractor
 - Note: This submittal has been reviewed by (Name of Prime Contractor) in accordance with the contract documents describing and defining the requirements of such review.
 - Signature of reviewer.
 - Name of reviewer (printed).
 - Title of reviewer (printed).
- E. In compliance with 1.03D above, the Prime Contractor shall submit in writing to the Architect/Engineer and Owner's representative (if any), prior to their first submission, the name and title of the reviewer who shall be an employee of the Prime Contractor for review and acknowledgment of same.
- F. As this project has a Construction Manager who is acting on the Owner's behalf and who has full-time construction site representation, the scheduling of submissions, the coordination, and interaction of other prime contractors, field conditions that affect the submission of, fabrication of, or installation of another Prime Contractor's submission, fabrication, or installation shall be made known to the Owner's Representative.
- G. Any resultant construction field condition that arises that is contrary to a submission made, that is conflicting with another Prime Contractor's submission, the schedule for construction, or with another Prime Contractor's constructed work shall be immediately identified by the Prime Contractor(s) and make known to the Owner's Representative, and, if such condition causes any construction schedule delay, "rereview" by the Architect/Engineer, additional work of the Architect/Engineer (such as field review, "redesign" or document preparation); or "reconstruction" of any work already built and/or accomplished by another Prime Contractor, the connection to such conditions and associated costs to accomplish same shall be the sole responsibility of the Prime Contractor found negligent in causing such conditions.
- H. No submission to the Architect/Engineer shall contain or utilize directly portions whole or in part of the contract documents, such as the reproduction of drawings, portions of the Project Manual, etc.

- I. The Architect's office reserves the right to retain any submitted technical data and shop drawings in abeyance if: submissions are incomplete, improper number of samples are submitted, if submissions are not accompanied by a properly-executed submittal cover sheet/letter of transmittal, or until all associated/interrelated shop drawings or interrelated technical data are submitted. See "K" below.
- J. Any submission not containing the information outlined and required in 1.03D above will not be reviewed by the Architect/Engineer for design intent, but rather rejected and sent back to the Prime Contractor for review by same.
- K. Any submission by the Prime Contractor that requires coordination with another material and/or system provided by this Prime Contractor or another Prime Contractor that has been reviewed, by that Prime Contractor and previously submitted to the Architect/Engineer may be rejected in whole or part by the Architect/Engineer, or held in abeyance by same until the corresponding and coordinating submittals are submitted as the concurrent review of all such submittals for design intent, may be deemed important by the Architect/Engineer. Any release given any entity other than the Architect/Engineer to fabricate, furnish, and install any material or system not reviewed by the Architect/Engineer for design intent shall become the sole responsibility of the releasing entity as well as the resolution of construction related issues or conflicts.
- L. In addition, the Prime Contractor shall not utilize nor refer to any schedule of work not created nor provided by the Architect/Engineer. The Prime Contractor's method in establishing, defining, and/or substantiating their ability to maintain the schedule presented in these contract documents and as prepared by the Owner's representative shall be exclusive of a defined time period of submittal review.
- M. The rejection or abeyance noted in the above subparagraph shall not be considered a delay or a reason for an extension of time in the construction schedule to the contract, as such cause for same shall have been brought upon by the Prime Contractor not providing the "pre-coordination" necessary for such submissions.
- N. The Architect is not legally bound to the approved construction schedule; only the Prime Contractors are bound to the approved construction schedule. The Architect is not required to expedite reviews or comments in the effort to expedite any Prime Contractors' submissions and/or construction schedule.

1.04 SUBMISSION REQUIREMENTS:

- A. Submit eight (8) copies of product data.
- B. Submit one (1) reproducible transparency (sepia) and seven (7) prints.
- C. Submit three (3) samples specified in each technical section.
- D. All specification/product data catalogue cuts submitted by the Prime Contractor(s) to the Architect's office for approval and processing shall be accompanied by a signed and dated "Submittal Cover Sheet", which shall acknowledge the Prime Contractor's receipt, completeness

and correctness of the submitted material. A Letter of Transmittal shall accompany all submissions, and it shall contain:

1. Date of submission.
2. Architect/Engineer's project title and project number (include all extensions).
3. Attention of: name of Architect's designated project representative.
4. Prime Contractor's name and address.
5. Notification of deviations from contract documents.
6. Any additional pertinent data.

E. Submissions shall include:

1. Date and revision dates.
2. Architect/Engineer's project title and number.
3. The Names of:
 - a. Architect/Engineer.
 - b. Prime Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
4. Identification of product.
5. Relation to adjacent structure or materials.
6. Field dimensions, clearly identified as such/
7. Technical specification section number.
8. Applicable standards.
9. A blank space 4" x 4", for the Architect/Engineer's stamp.
10. Identification of deviations from contract documents.
11. Prime Contractor's stamp, initialed or signed, certifying to review of submission, verification of field measurements and compliance with contract documents.

F. Catalog Data:

1. Submit catalog data with a "Catalog Data" cover sheet with information as listed in paragraph 1.03, F., above.

G. Concurrent Submittals: In addition to submitting the above to the Architect's office, the Prime Contractor will also send, concurrently, one (1) copy of drawing/cuts simultaneously to the Construction Manager.

1.05 RESUBMISSION REQUIREMENTS:

A. Shop Drawings:

1. Revise initial drawings as required and resubmit as specified for initial submission.
2. Indicate on drawings any changes which have been made other than those requested by the Architect/Engineer.

B. Product Data and Samples:

1. Submit new data and samples as required for initial submission.

1.06 DISTRIBUTION OF SUBMISSIONS:

A. Prime Contractor shall distribute copies of shop drawings, product data, and/or samples which carry the Architect/Engineer approval stamp to:

1. Prime Contractor's file (as required).
2. Job site file (as required).
3. Record document file (as required).
4. Other prime contractors, as required for coordination (as required).
5. Subcontractor (as required).
6. Suppliers and Fabricators (as required)
7. The Construction Manager (2 copies).

B. Distribute samples as directed, by Architect/Engineer.

C. The Prime Contractor will be responsible for the distribution of their approved drawings/cuts in a timely manner to other Prime Contractors (and subcontractors) for coordination with their work. Any additional costs generated due to the lack of transfer information will be borne by the Prime Contractor responsible for distribution. In the event the Prime Contractor fails to distribute shop drawings/product information to other Prime Contractors (and their subcontractors), the Owner reserves the right to have the Architect make the necessary copies and Federal Express to the parties involved. All costs incurred by the Architect will be back-charged to the Prime Contractor responsible for not distributing the shop drawings/product information. The Prime Contractors are responsible for coordinating their own work with the work of other Prime Contractors and/or their subcontractors.

D. Shop drawings/submittals returned to the Prime Contractors for second resubmission will require a two (2) day turnaround on resubmission. Submittals requiring a second resubmission will result in charges for additional Architect/Engineer review time. All returned shop drawings must be sent Federal Express Overnight Priority Delivery.

1.07 ARCHITECT/ENGINEER:

- A. Review for:
 - 1. Design concept of project.
 - 2. Compliance with contract documents.
- B. Review of separate items does not constitute review of an assembly in which item functions.
- C. Stamp and initial or sign to review of submission.
- D. Return submissions to Prime Contractor for distribution.
- E. Note: Based upon the amount of multiple submittals received in one day, and their content, *unless they are specifically numbered by the Prime Contractor for their order of relative importance* on his Letter of Transmittal, the Architect shall establish the level of importance of each submittal, and shall be allowed sufficient time (in the Architect's professional judgement) to permit adequate review. Such submissions will be reviewed either: a) in the time order in which they were received by the Architect's office, b) in their natural progressive order of construction placement, or c) in order of preference, as determined by the Architect. As a result of multiple/sequential submissions, no delays in time, or Prime Contractor hard or soft costs shall be implied or imposed onto the Architect. It is the Prime Contractor's complete responsibility to adhere to the prepared Construction Schedule at all costs, including extended delays which may be incurred by time required for adequate review from the Architect's office.
- F. Architect's Stamp: The Architect's stamp (indicating initials and date), affixed to any shop drawing, manufacturer's specification cut or sample is only for design concept conformance, and general compliance with the content of the contract documents. This does not relieve the Prime Contractor of his/her responsibility to comply with the requirements of the Contract Documents.

1.08 TIME FOR SUBMISSION:

- A. The Prime Contractor unless otherwise directed by the Architect, shall submit to the latter for approval all shop drawings, product data, and samples as specified above.

Within 2 weeks of Notice to Proceed, the following submittals shall be sent:

<u>Section</u>	<u>Description</u>	<u>Item</u>
1A	Schedules & Reports	Plan of Operations & Progress Schedules
1C	Insurance Requirements	Certificates of Insurances
1D	Product Approval Standard	Notification Letter to EPA - Dump Receipt & Waste Manifest, NYS Labor Dept & EPA-AHERA Certificates
01015	Project Schedule	Contractor's Project Schedule, reflecting critical milestones & completion dates
01020	Allowances	N/A
01030	Special Procedures and Provisions	Written Guarantee of complete installation(s), As-Built drawings, equivalency requirements.
01050	Uniform Safety Standards for School Construction and Maintenance Projects - Commissioner's Regulations	N/A
01070	Abbreviations and Symbols	N/A
01085	Applicable Standards	N/A
01230	Construction Phase Clarifications	Weekly RFI Logs during construction
01300	Submissions	this Section
01500	Construction Facilities & Temporary Controls	Staging Plans, Temporary Partitions Layout
01550	Selective Demolition	Methods & Operations Sequence Schedule, Demolition & Removals sequencing
01610	Asbestos Abatement	Contractor Quality Assurance Items 1-4, Valid Asbestos Handling License, Proof of EPA-Accreditation for Response Actions (submitted w/ Bid) Notification Letter to EPA - Dump Receipt & Waste Manifest, NYS Labor Dept & EPA-AHERA Certificates, Log Book, Waste Manifests, Dump Receipts, Employee Protection Plan, OSHA Medical Monitoring, Respiratory Training and Protection Plan, copies of all inspection & permit certifications.
01611	Test Laboratory Services	Laboratory Approval & Qualifications per 1.05A; Analysis of Contaminated Fillers via NIOSH Method, using Phase Contrast Microscopy; Test Results
01612	Methods of Removal & Temporary Enclosures	Room Inspection Reports; Submission of Asbestos Caution Signs & Text, Written Emergency Procedures, Detail on Temporary Walls
01613	Asbestos Removal	N/A
01614	Air Monitoring	Air Monitoring Test Results; Daily Logs from Safety Monitor
01615	Project Decontamination	Air Maintain Test Results
01616	Clean-Up Procedures	N/A
01617	Monitoring & Supervision	Air Sampling & Analysis Data Results (per 1.04); Post Removal Test Results
01700	Contract Closeout	Contractor's Notice of Substantial Completion, Contractor's Punchlist, Final Inspection Notice, O&M manuals, Contract Closeout Documents, As-Built, Guarantees

01710	Final Cleaning	N/A
01720	Project Record Documents	Project Record Documents at project completion
02000	Site Work Overview	Alternate / Additional Design Criteria
04100	Mortars	Technical Data (materials), Design Mix, pigment samples
04200	Unit Masonry	Technical Data, Fire Performance Data, Field Mock-ups, Unit Samples, Accessories Samples
04500	Masonry Restoration & Cleaning	Technical Data, Samples

Within 4 weeks of Notice to Proceed, the following submittals shall be sent:

<u>Section</u>	<u>Description</u>	<u>Item</u>
02200	Earth Work	Sheetpiling, bracing and shoring details, certified by a NYS Professional Engineer. Shop Drawings, Details, Technical Data, Written Confirmation of all Easements
03300	Cast In Place Concrete	Technical Data, Shop Drawings, Design Mix, Test Reports, Material Certificates, Concrete Testing Lab
06100	Rough Carpentry	Material Certificates, Treatment Data
06170	Prefabricated Structural Wood	NYSPE-prepared Design Calculations, Shop Drawings, Technical Data
06200	Finish Carpentry	Technical Data, Shop Drawings
06204	Wood Veneer Cabinetry	Technical Data, Shop Drawings, Samples
06208	Wood Raised Panel	Technical Data, Shop Drawings
06600	Fiber-Reinforced Polymer	Technical Data, Shop Drawings, Samples
07536	Heat-Welded Modified Bitumen Roofing	Technical Data, Shop Drawings, Tapered Insulation Drawings, UL/FM Compliance Data, Certifications
07602	Flashing	Technical Data, Shop Drawings, Samples
07715	Prefabricated Metal Fascia & Soffit Panels	Technical Data, Shop Drawings, Samples
07900	Caulking	Technical Data, Certifications, Test Reports
07910	Joint Sealers	Technical Data, Certifications, Test Reports
07920	Preformed Joint Sealers	Technical Data, Samples

PART TWO - PRODUCTS

NOT APPLICABLE

PART THREE - EXECUTION

NOT APPLICABLE

END OF SECTION

BBS

ARCHITECTS ☐ LANDSCAPE ARCHITECTS

☐ ENGINEERS

244 East Main Street ▪ Patchogue, New York 11772
Tel (631) 475-0349 ▪ Fax (631) 475-0361 ▪
Const. Admin., MEP & T Depts. Fax (631) 654-9398

Submittal Cover Sheet

Name of Contractor: _____

Project: _____

Date: _____ Architect's Project No: _____

Items Submitted: _____

Manufacturers: _____

Model No's: _____

Submission Number: _____

Acknowledgement by Contractor: This submittal has been reviewed by the above named contractor in accordance with the contract documents describing and defining the requirements of such review

Signature: _____ Title of reviewer (print) _____

Name (print): _____ Date of review: _____

Notes:

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01450 - TESTING LABORATORY SERVICE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to Work of this Section.

1.02 SUMMARY

- A. The Owner will pay for services of the independent testing laboratory. Source of services as well as payment and rates of payments will be as directed by the Owner's Representative. Testing specified in the Project Manual shall be performed at a minimum. Construction Manager or Architect may request additional testing which will be compensated as agreed upon between the parties.
- B. Inspections and testing required by laws, ordinances, rules, regulations, or order of public authorities and General Conditions.
- C. Certification of products and mill test reports: Respective Specification Sections.
- D. Test, adjust, and balance of equipment.
- E. Inspection, sampling, and testing: Soils, asphalt, concrete, steel, masonry, mortar, and grout, etc. and specified elsewhere.
- F. Inspections, test, and related actions specified in this section and elsewhere in Contract Documents are not intended to limit contractor's quality control procedures, which facilitate compliance with requirements of Contract Documents.
- G. Related work specified elsewhere
 - 1. Refer to Section 01451 - Tests, Inspections, and special inspections.

1.03 QUALIFICATIONS OF LABORATORY AND SUBMITTALS

- A. Meet requirements of ASTM E329, current edition "Standards of Recommended Practice for inspection and testing Agencies for Concrete, Steel, and Bituminous Materials as used in Construction".
 - 1. The term "agency" as used in Section 4 of ASTM E329 shall mean the local or closest office of said agency.
- B. Laboratory qualifications for inspection, sampling, and testing of soils and aggregates shall be comparable to the requirements of ASTM E329.
- C. Testing Equipment
 - 1. Calibrated at maximum 12-month intervals by devices of accuracy. Traceable to either:

- a. National Bureau of Standards
 - b. Accepted Values of Natural Physical Constants.
 - c. Submit copy of Certificate of Calibration, made by accredited calibration agency.
- D. Submit documentation of specified requirements. Submit 2 copies to the Owner's Representative.
- E. All testing and inspection performed by the testing laboratory shall be under the direct supervision of a Professional Engineer licensed in the state of the construction activities. This Professional Engineer shall submit a letter certifying that all testing services are in conformance with the standards and specifications as specified in these Contract Documents. The letter shall also certify that all tested and inspected items and procedures conform to the Contract Documents, except where specifically noted on the inspection reports.
- F. All inspectors shall have at least one (1) year of experience performing the type of inspections to be performed on this project. Qualifications and experience of proposed inspectors shall be submitted to the architect for approval prior to the beginning of any testing.

1.04 QUALIFICATION OF SPECIAL INSPECTOR

- A. The special inspector must have the expertise necessary to ensure compliance with the approved Construction Documents and referenced standards.
- B. The special inspector, if an individual, should be a registered Structural Engineer or Professional Engineer specializing in structural engineering. If the special inspector is a agency, the agency should be under the responsible direction of a registered Structural Engineer or Professional Engineer specializing in Structural Engineering.
- C. Special inspector qualifications (New York State Department of State, Technical Bulletin January 2003).
- 1. Reinforced Concrete: New York State Licensed Professional Engineer (PE) with relevant experience.
 - 2. Prestressed Concrete: Pre-tension tendons and post-tension tendons: PE with relevant experience.
 - 3. Welding: Current AWS Certified Welding Inspector.
 - 4. High Strength Bolting and Steel Frame Inspection: PE with relevant experience.
 - 5. Masonry: Current ICC Structural Masonry Certification and one (1) year relevant experience.
 - 6. Sprayed Fire Resistant Materials: PE with relevant experience.

7. Excavation and Filling; Verification of Soils and Bearing, Piling and Drilled Piers, Modular Retaining Walls and Related Geotech: PE with relevant experience.
8. Inspection of Fabricators: Bar joist, metal building and structural steel - see welding requirements.
9. Exterior and Interior Architectural Wall Panels: PE with relevant experience.
10. Exterior Insulation and Finish Systems: New York State Registered or Licensed Design Professional.
11. Smoke Control: Expertise in fire-protection engineering, mechanical engineering, and certification as air balancers.
12. Seismic Resistance: Refer to the applicable categories of this list.

NOTE: The list includes the word 'relevant' to describe experience for persons not holding formal certifications.

1.05 LABORATORY RESPONSIBILITIES, LIMITATIONS OF AUTHORITY

- A. Provide qualified personnel promptly on notice.
- B. Perform special inspections, sampling, and testing of materials and methods of construction.
 1. Comply with specified standards; ASTM, other recognized authorities and as specified.
 2. Ascertain compliance with requirements of Contract Documents.
- C. Promptly notify Architect, Construction Manager, and Contractor of irregularities in the work to be performed in accordance with the Construction Documents and deficiencies of work performed which are observed during performance of services.
- D. Promptly submit two (2) copies to the Construction Manager (one (1) to be turned over to Owner), two (2) copies directly to the Architect/Engineer and one (1) to the Contractor of reports of inspections and test, including the following information, as applicable:
 1. Date issued.
 2. Project title and number.
 3. Testing laboratory name and address.
 4. Name and signature of field inspector.
 5. Date of inspection or sampling.
 6. Record of temperature and weather.
 7. Name and signature of laboratory inspector.

8. Identification of product and specification section.
 9. Location in project.
 10. Designation of the work and test method.
 11. Observations regarding compliance with Contract Documents.
 12. Complete inspection or test data.
 13. Test results and interpretation of test results.
 14. Recommendation on retesting.
- E. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on requirements of contract documents.
 2. Approve or accept portion of work.
 3. Perform duties of the Contractor.

1.06 INSPECTOR RESPONSIBILITIES

- A. Notify the contractor of their presence and responsibilities at the job site.
- B. Observe assigned work. The inspector shall inspect all work for which they are responsible for conformance with the plans and specifications. Perform inspection in a timely manner to avoid delay of work.
- C. Report non-conforming items. Inspector shall bring all nonconforming items to the immediate attention of the contractor for correction. If any such item is not resolved in a timely manner or is about to be incorporated into the work, the Construction Manager and the Architect shall be notified immediately and the item noted in the inspector's written report. The inspector shall write a separate report to be posted at the job site regarding noted discrepancies that should contain, as a minimum, the following information about each nonconforming item:
 1. Description and exact location.
 2. Reference to applicable plan sheets, details and specifications.
 3. Resolution of corrective action taken and the date.
- D. Provide timely reports. The Inspector shall complete written inspection reports for each visit to the site. These reports shall be organized on a daily format and will be submitted to the Construction Manager, Architect, and Contractor at the approved times and frequency. In the reports the inspector should:
 1. Describe inspections and tests made, with applicable locations.
 2. Indicate how nonconforming items are to be or were resolved.
 3. List unresolved items, parties notified, time and method of notification.

4. Itemize changes authorized by the Architect.

- E. Submit final report. Inspector shall submit a final, signed report to the Construction Manager and Architect stating that all items requiring inspection and testing were fulfilled and reported, and to the best of their knowledge, in conformance with the approved plans and specifications. Items not in conformance, unresolved items, or any discrepancies in inspection coverage (i.e., missed inspections, periodic inspection when continuous inspection was required, etc.) should be specifically itemized in this report.

1.07 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall coordinate with independent testing agency performing inspections, tests, and quality control services.
1. Construction Manager will schedule services of independent testing to agency to perform services so specified.
- B. Retest Responsibility: Where results of required inspection, test, or similar service are unsatisfactory (do not indicate compliance of related work with requirements of Contract Documents), retests are the responsibility of the Contractor. Retesting of work revised or replaced by the Contractor is the Contractor's responsibility, where required tests are performed on original work. Retesting shall be performed by testing laboratory as directed by Construction Manager.
- C. Responsibility of Associated Services: Contractor is required to cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at project site.
- D. Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of work and without the need for removal/replacement of work to accommodate inspections and tests. Notify Construction Manager as required for all scheduling of times for inspections, test, taking of samples, and similar activities are contractor's responsibility.

PART 2 - MATERIALS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01451 - TESTS, INSPECTIONS & SPECIAL INSPECTIONS
QUALITY ASSURANCE PLAN

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to Work of this Section.

1.02 SCOPE / SUMMARY:

- A. **Scope:** This project will require both general inspections and special inspections coordinated with all required testing and certifications throughout the Project Manual and/or the Building Code of the State of New York, as listed below. The Project Manual shall be carefully reviewed by the Prime Contractors for actual and detailed descriptions concerning responsibilities with regard to testing parameters. All testing which is assigned to a Prime Contractor shall be borne as a part of their submitted Base Bid for this project, and shall not be subject to additional costs to the Owner. There are specific general inspections, as well as coordination of inspections, which are to be included in each Prime Contractor's Base Bid submitted; refer to each specification section for complete information. ***Note: The cost of all General and Special Inspections performed by the independent testing laboratory/laboratories retained by the Owner shall be directly borne by the Owner, implemented by and coordinated through the Owner's Representative and/or the Construction Manager.***

B. **Summary:**

1. This Section includes responsibilities relating to quality control services and extent of quality control services to be performed.
2. Related Work Specified Elsewhere
 - a. Section 01450 - Testing Laboratory Services.
3. Definitions: Quality control services include inspections and tests, special inspections and actions related thereto including reports, but do not include contract enforcement activities performed directly by Architect/Engineer. Quality control services include those inspections and tests, special inspections and related actions performed by independent agencies and governing agencies as well as directly by Contractor.
 - a. Testing service is required to immediately notify the Architect and the Construction Manager of discrepancies observed in the Work performed and to be performed to the Contract Documents.
4. Inspections, tests, special inspections and related actions specified in this Section and elsewhere in Contract Documents are not intended to limit a Contractor's quality control procedures

which facilitate compliance with requirements of Contract Documents.

5. Requirements for quality control services by Contractor, as requested or to be requested by Architect/Engineer, Owner, governing authorities, or other authorized entities are not limited by provisions of this Section.
6. Contractors shall review and become familiar with the requirements of Article 13.5, Tests and Inspections, of the General and Supplementary Conditions covering the provisions for testing of the Work.

1.03 RESPONSIBILITIES:

- A. Contractor shall coordinate with independent testing agency performing inspections, tests, and quality control services.
 1. Construction Manager will schedule services of independent testing agency to perform services so specified. When no Construction Manager is hired by the Owner, it will be the Contractor's contractual responsibility to schedule the services of independent testing.
 2. The Owner will pay for services of the independent testing laboratory, awarded through the Owner's Representative. Source of services as well as payment and rates of payments will be as directed by the Owner's Representative. Testing specified herein shall be performed at a minimum. Construction Manager or Architect may request additional testing; payment for additional testing is subject to the provisions of the General Conditions.
- B. Retest Responsibility: Where results of required inspection, test, or similar service are unsatisfactory (do not indicate compliance of related work with requirements of Contract Documents), retests are responsibility of Contractor. Retesting of work revised or replaced by Contractor is Contractor's responsibility, where required tests were performed on original work. Retesting shall be performed by testing laboratory as directed by the Owner's Representative.
- C. Responsibility for Associated Services: Contractor is required to cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at project site.
- D. Coordination: Contractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of work and without the need for removal/replacement of work to accommodate inspections and tests. It is the contractual responsibility of the Contractor to continually notify the Owner's Representative of

all scheduling of times for inspections, tests, taking of samples, and similar activities.

1.04 SAMPLING AND TESTING (GENERAL):

1. Sampling and testing is required for the following Sections of Work and, unless otherwise indicated, shall be performed by an independent testing lab and paid for by the Owner through the Owner's Representative. ***Note: Certain sections indicated under this item also have specific BCNYS Special Testing & Inspection requirements, which shall be conducted in conformance with BCNYS Chapter 17 guidelines; all special testing & inspection costs shall be borne by the Owner. Refer to item 1.22 for the listing of special inspections required. Where an item may be duplicated under both general and special inspections, only one set of testing is required; special inspection requirements shall prevail.***
2. Section 02012 - Unclassified Excavation - Daily testing of in-situ soil, submitted to the Owner's Representative.
3. Section 02200 - Earthwork: Soil testing and inspection service during earthwork operations for subgrades and fill.
4. Section 02222 - Excavating, Backfilling & Compacting for Utilities: Testing at intervals not exceeding 200'-0" of trench for first and every other 8" lift of compacted trench backfill.
5. Section 02224 - Excavating, Backfilling & Compacting: Testing at intervals not exceeding 200'-0" of trench for first and every other 8" lift of compacted trench backfill. Refer to 02224, 3.09A for additional information.
6. Section 02230 - Paving Base Course: Field density testing, moisture & density relationship, mechanical analysis, plasticity index, base material, thickness and compaction, source testing. Refer to 02230, 3.02A-D for additional information.
7. Section 02602 - Asphalt Concrete: Testing paid for by General Contractor - Per 02602, 3.04B, testing of finished surface of the base course shall be accomplished by the GC; utilizing a 16 foot straight edge (a 10 foot straight edge used on vertical curves).
8. Section 02475 - Bituminous Concrete Pavement: Quality control testing of uncompacted asphalt concrete mix and in-place compacted pavement.
9. Section 03310 - Concrete Work: Inspection of reinforcing steel placement; field quality control of concrete; tests for concrete materials and mix design tests (slump, air content, temperature, compression test, compressive strength tests (cylinders) taken at 7 & 28 days. Testing of FF/FL floor tolerances.

10. Section 03311 - Concrete Curb: Random batch testing shall be made. Refer to 03311, 2.01.C.2 for additional information.
Note: this item also has specific BCNYS Special Testing & Inspection requirements, which shall be conducted in conformance with BCNYS Chapter 17 guidelines; all special testing & inspection costs shall be borne by the Owner.
11. Section 03650 - Underlayment Concrete: Field quality control slump testing and cubes tested in accordance with ASTM C109. Refer to 03650, 3.04 for additional information.
12. Section 04200 - Unit Masonry: Field quality control of unit masonry and masonry assemblies.
13. Section 05100 - Structural Metal Framing: Field quality control for welds; field quality control for high strength steel torqued bolted connections; field quality control for structural steel alignment.
14. Section 05120 - Structural Steel: Source quality control (per 05120, 1.02D) materials and fabrication procedures; Per 05120, 3.02 - Inspection of high-strength bolted connections, shop and field welding.
15. Section 05210 - Steel Joists & Joist Girders: Source quality control SJI (Steel Joist Institute) certifications through steel fabricator. Inspection of high-strength bolted connections, shop and field welding.
16. Section 05300 - Metal Decking: GC to supply certified shop drawings per Section 05300.
17. Section 05400 - Cold Formed Metal Framing: for field quality control.
18. Section 08520 - Aluminum Windows: Field quality control testing per 08520, 3.03.
19. Section 09910 - Paints: Field quality control for painting.
20. Section 15802 - Inspection, Testing & Balancing: HVAC Contractor to conduct testing per 15802, 1.01A.
21. Section 15411A - Plumbing Domestic Water Piping System: Plumbing Contractor to conduct testing per 15411A, 3.12.
22. Section 15412A - Plumbing Sanitary Piping System: Plumbing Contractor to conduct testing per 15412A, 3.11.
23. Section 15413A - Plumbing Storm Water Piping System: Plumbing Contractor to conduct testing per 15413A, 3.07.
24. Section 16010 - General Provisions - Electrical Contractor to conduct testing per 16010 requirements.
25. Section 16470 - Panelboards: Electrical Contractor to conduct testing per 16470, 3.01 requirements.

- 26. Section 16511 - Firestopping: Electrical Contractor to conduct testing per 16511, 1.05 requirements.
- 27. Section 16720 - Fire Alarm System: Electrical Contractor to conduct testing per 16720, 3.02 requirements.

Note: For those projects utilizing a Construction Manager, the Construction Manager's involvement with testing shall be limited to coordinating, documenting (recording the date, time, location and type of test being performed), witnessing, filing copies of reports prepared by the testing agency, and transmitting copies of the reports to the Owner. The reports shall be prepared by the testing agency in accordance with criteria established by 1.04 of this Section and BCNYS Chapter 17 and in a format approved by, the Architect/Engineer. Where no Construction Manager is retained, the coordination and documentation of all required tests shall be the complete and sole responsibility of the Prime Contractor responsible for the work being tested in conjunction with the testing agency.

Note: The Construction Manager will coordinate and document (recording the date, time, location and type of test being performed) all special inspections or testing as required by BCNYS Chapter 17 requirements.

- B. Additional Information: All Prime Contractors shall review all specifications of their disciplines for additional information concerning general testing services necessary for this project. The list provided above shall not be considered mutually exclusive.
- C. Test procedures to be used shall be submitted for approval of the Owner's Representative where other than those specified are recommended by the testing agency.

1.05 QUALIFICATION OF LABORATORY:

- A. Shall meet "Recommended Requirements of Independent Laboratory Qualifications," published by American Council of Independent Laboratories. For concrete and steel the laboratory shall comply with the basic requirements of ASTM E 329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."
- B. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of deficiencies reported by inspection.
- C. Testing equipment shall be calibrated at maximum 12 month intervals by devices of accuracy traceable to either:
 - 1. National Bureau of Standards.
 - 2. Accepted values of natural physical constants.
 - 3. Submit copy of certificate of calibration, made by accredited calibration agency.
- D. Refer to Section 01450 - *Testing Laboratory Services* for additional requirements.
- E. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Contract documents.
2. Approve or accept portion of work.
3. Perform duties of the Contractor.

1.06 SUBMITTALS:

- A. Testing document submittal procedures shall be as requested by the Construction Manager and the Architect.
- B. Promptly submit two (2) copies to the Owner's Representative (one (1) to be turned over to the Owner), two (2) copies directly to the Architect/Engineer, and one (1) to the Contractor of reports of inspections and test, including the following information, as applicable:
 1. Date issued.
 2. Project title and number.
 3. Testing laboratory name and address.
 4. Name and signature of field inspector.
 5. Date of inspection or sampling.
 6. Record of temperature and weather.
 7. Name and signature of laboratory inspector.
 8. Identification of product and specification section.
 9. Location in project.
 10. Designation of the work and test method.
 11. Observations regarding compliance with Contract Documents.
 12. Complete inspection or test data.
 13. Test results and interpretation of test results.
 14. Recommendation on retesting.

1.07 SOIL COMPACTION TESTING:

- A. The Contractors for the Work of Division 2 specification - "Earthwork" shall cooperate and coordinate with the soil testing and inspection service for quality control testing during earthwork operations as follows:
 1. Field density test reports.
 2. One optimum moisture-maximum density curve for each type of soil encountered.

3. The Contractor shall arrange for Soils Engineer to be on the site for observation and testing during times when the following operations are being performed:

- a. Proofrolling.
- b. Compaction of subgrades and fill. During compaction operations, the Soils Engineer shall carefully monitor existing foundations to detect possible foundation movements. If movement is detected, Work shall be stopped and the Architect immediately notified.

- B.** Percentage of Maximum Density Requirements: Provide not less than following percentages of maximum density of soil material compacted at optimum moisture content, for the actual density of each layer of soil material in place.

1. Foundations: Compact top 12 inches of subgrade and each 8-inch layer of backfill or fill material to 95 percent Modified Proctor maximum dry density.
2. Building Slabs and Steps: Compact top 12 inches of subgrade and each 8 inch layer of backfill or fill material to 95 percent Modified Proctor maximum dry density.
3. Lawn, Unpaved Areas, and Borrow Pit: Compact top 6 inches of subgrade and 8 inch layer of backfill or fill material to 90 percent Modified Proctor maximum dry density.
4. Walkways: Compact top 6 inches of subgrade and each 8-inch layer of backfill or fill material to 95 percent Modified Proctor maximum dry density.
5. Pavements: Compact top 12 inches of subgrade and each 8-inch layer of backfill or fill material to 95 percent Modified Proctor maximum dry density.
6. Underground Utilities: Provide the preceding requirements for the respective utility location(s).
7. Underground Piping and Conduit Outside Building:
 - a. Bedding shall begin by placing 4 to 6 inch bedding of the approved backfill material and compacting to between 85 to 90 percent of the Modified Proctor Maximum Dry Density. The width of the bedding shall be the diameter of the pipe plus 2 feet.
 - b. Haunching shall consist of placing the approved backfill material to the spring line of the pipe and conduit and compacting between 85 to 90 percent of the Modified Proctor Maximum Dry Density. This lift shall not exceed 9 inches loose. The pipe and conduit bedding and flow line shall not be disturbed as a result of the haunching operation.
 - c. Initial backfill shall consist of placing the approved backfill material to the top of the pipe and conduit and compacting to between 85 and 90 percent of the

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Modified Proctor Maximum Dry Density. This lift shall not exceed 9 inches loose. Crushed or buckled pipe and conduit as a result of the backfilling operations will be removed and replaced with no additional payment.

- d. Initial backfill shall continue in 6-inch lifts with the approved backfill material to a depth of 12 inches above the pipe.
 - e. Finish backfilling of the trench shall consist of placing the approved backfill or material from the trench excavation in 6-inch lifts to the grade of the trench. Finish backfilling within paved areas shall continue to the base of the compacted aggregate with the approved backfill material.
 - 8. Retaining Walls: Compact each 8 inch layer of backfill or fill material to 95 percent Standard Proctor Maximum Dry Density.
- C. Quality Control Testing During Construction: Testing service must inspect and approve subgrades and fill layers before further construction work is performed thereon. Tests of subgrades and fill layers will be taken as follows:
 - 1. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least 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 Architect, except that a minimum of one test shall be performed for each 15,000 sq.ft. of building area.
 - 2. Paved areas and Building Slab Subgrade: Make at least on field density test of subgrade for every 2,000 sq.ft. of paved area or building slab, but in no case less than 3 tests.
 - 3. Foundation and Retaining wall Backfill: Take at least 2 field density tests, at locations and elevations as directed.
 - 4. Trench Backfill: For each compacted backfill layer make one field density test between each drainage structure.
- D. If, in the opinion of the Architect, based on reports of testing service and inspection, subgrade or fills which have been placed are below specified density, additional compaction work and testing shall be provided by the Contractor for the Section of Work involved at no additional expense, until subgrades or fills meet or exceed specified density.

1.08 BITUMINOUS PAVING TESTING:

- A. The Contractor for the Work of Division 2 specification "Asphalt Pavement" shall cooperate and coordinate with the testing

laboratory to perform field inspection of the pavement work, unless specifically noted otherwise.

- B.** Field quality control testing shall be performed during paving operations. Perform the following sampling and testing of asphalt concrete mixtures for quality control during paving operations. Record the locations where samples are taken to correlate with subsequent testing.
- C.** Test uncompacted asphalt concrete mix and report the following:
 - 1. Sampling: AASHTO T168 (ASTM D979).
 - 2. Asphalt Cement Content: AASHTO T164 (ASTMD2172).
 - 3. Perform at least one initial test for paving, unless otherwise specified or directed.
- D.** Test in-place, compacted pavement for density and thickness, as herein specified. Perform one test for each 500 sq.yds. but not less than one test per day, unless otherwise specified or directed.
- E.** The Contractor shall pay for and perform additional Work and testing as may be required if any of the previous tests indicate insufficient values or if directed by the Architect. Continue Work and testing until specified values have been attained.
- F.** Asphalt concentrate material not complying with specified requirements will not be acceptable. The Contractor shall repair or remove and replace defective paving as directed by the Architect, at no additional cost to the Owner.

1.09 INSPECTION OF REINFORCING STEEL PLACEMENT:

- A.** The Contractor for the Work of Division 3 specifications for "Cast-In-Place Concrete" and "Concrete Work", shall cooperate and coordinate with the testing laboratory to perform field inspection of the placement of reinforcing steel prior to, and in some specified instances during the placement of concrete structures, unless specifically noted otherwise.
- B.** Inspection shall include the following:
 - 1. All structures:
 - a. Size of all reinforcing bars.
 - b. Measurement of bar laps.
 - c. Spacing of reinforcing bars.
 - d. Measurement of reinforcing concrete cover.
 - e. Adequacy of reinforcement ties to prevent movement during concrete placement.
 - f. Placement of reinforcing chairs, bolsters, and concrete blocks supporting reinforcement.
 - g. Condition of reinforcing free of corrosion scale, grease, oil, and other foreign materials which would reduce bond of concrete to reinforcement.

2. Slabs-on-Grade:

- a. Nominal size of welded wire fabric.
 - b. Measurement of fabric lap.
 - c. Type, size, and spacing of supports for welded wire fabric.
 - d. Adequacy of maintaining welded wire fabric in correct position during the concrete placement. If concrete workers walk on fabric during concrete placement, is fabric lifted back in to correct position prior to set of concrete. (THE TESTING LABORATORY SHALL BE PRESENT DURING THE PLACEMENT OF SLABS-ON-GRADE, WHICH USE WELDED WIRE FABRIC OR REINFORCING STEEL BARS).
 - e. Slabs-on-grade with fibrous reinforcement do not require this inspection.
- C. The Testing Laboratory shall report inspection results in writing to the Architect, Construction Manager, and Contractor the same day that tests are made. Reports shall indicate the specific structural items inspected and the location, with column grid references, where possible to clearly identify the inspected items.
- D. Additional Inspections: Where inspections indicate deficiencies and concrete placement of any structural item is made without this required inspection, the testing laboratory shall conduct additional tests, including concrete coring, magnetic detection devices, sonic testing devices, and other methods as required to verify the conformance of the reinforcing steel placement to the Contract Documents. The Contractor shall pay for such inspections conducted and other additional inspections as may be required when unacceptable or un-inspected reinforcing steel placement is verified.

1.10 CONCRETE TESTING:

- A. The Contractor for the Work of Division 3 specification for "Cast-In-Place Concrete" and "Concrete Work", shall cooperate and coordinate with testing laboratory to perform field quality control testing during concrete work under Division 3.
- B. Quality Control Testing During Construction: Perform sampling and testing for field quality control during the placement of concrete, as follows:
- 1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
 - 2. Slump: ASTM C143, one test for each concrete load at point of discharge, and one for each set of compressive strength test specimens.
 - 3. Air Content: ASTM C231, pressure method; one for every other concrete load at point of discharge or when the indication of change requires.

4. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below and when 80 degrees F. and above; and each time a set of compressive test specimens is made.
5. Compression Test Specimens: ASTM C31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
6. Compressive Strength Tests: ASTM C39, one set for each day's placement exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - a. When the frequency of testing will provide less than 5 strength tests for a given mix design, conduct testing strength tests for a given mix design, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
 - b. When the total quantity of a given mix design of concrete is less than 50 cu.yds., the strength tests may be waived by the Architect if, in his judgment, adequate evidence of satisfactory strength is provided.
 - c. When the strength of field-cured cylinders is less than 85 percent of companion laboratory cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- C. The testing laboratory shall report test results in writing to the Architect, Construction Manager, Contractor, and ready-mix supplier on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of Contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, type and amount of fibrous reinforcement, compressive breaking strength, and type of break for both 7 day tests and 28 day tests.
- D. Additional Tests: The testing service will make additional tests of in-place concrete, as directed by the Architect, when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure. The testing service shall conduct tests to determine the strength and other characteristics of the in-place concrete by compression tests on cored cylinders complying with ASTM C42 or by load testing specified in ACI 318 or other acceptable nondestructive testing methods, as directed. The Contractor shall pay for such tests conducted and other additional testing as may be required, when unacceptable concrete is verified.

- E.** Evaluation of Quality Control Tests: Do not use concrete delivered to the final point of placement, which has slump or total air content outside the specified values.
1. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of 3 consecutive compressive strength tests results equal or exceed the 28 day design compressive strength of the type or class of concrete; and no individual strength test falls below the required compressive strength by more than 500 psi.
 2. Strength tests of specimens cured under field conditions may be required by the Architect to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded by the field quality control laboratory at the same time and from the same samples as the laboratory cured specimens.
 - a. Provide improved means and procedures for protecting concrete when the 28 day compressive strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders.
 - b. When laboratory cured cylinder strengths are appreciably higher than the minimum required compressive strength, field cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even though the 85 percent criterion is not met.
 - c. If individual tests of laboratory cured specimen produce strengths more than 500 psi below the required minimum compressive strength or if tests of field cured cylinders indicates deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.
 3. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength.
- F.** Deficient concrete shall be removed and replaced by the Contractor without additional cost to the Owner.

1.11 CONCRETE MATERIALS AND MIX DESIGN:

- A.** Concrete Materials and Mix Design: The Contractor(s) for Division 3 specification "Cast-In-Place Concrete" and "Concrete Work" shall provide the following in conformance with the requirements of the Division 3 specifications:

1. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94.
2. Product Data: Submit copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, waterstops, joint systems, chemical floor hardeners, and dry shake finish materials.
3. Laboratory Test Reports: Submit copies of laboratory test reports for concrete materials and mix design tests. The Architect's review will be for general information only. Production of concrete to comply with specified requirements is the Contractor's responsibility.
4. Mix Design: Submit copies of concrete mix designs for each type of mix required by the Concrete Schedule indicating the amount of each ingredient (by weight) in one cubic yard of concrete, the calculated water/cement ratio, and the slump.

B. Tests for Concrete Materials:

1. For normal weight concrete, test aggregates by the methods of sampling and testing of ASTM C33.
2. For lightweight concrete, test aggregates by the methods of sampling and testing of ASTM C330.
 - a. For portland cement, sample the cement and determine the properties by the methods of test of ASTM C33.
3. Submit written reports for each material sampled and tested, prior to the start of Work. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

- C.** Submit signed statement from ready-mix plant that concrete furnished for the Project will exactly conform to the approved design mixes.

1.12 TESTS FOR FF/FL: Refer to Division 3 specification for "Cast-In-Place Concrete" and "Concrete Work".

1.13 TESTS FOR MORTAR:

- A.** The Contractor for the Work of Division 4 - "Unit Masonry", shall cooperate with a separate testing laboratory to perform field quality control testing during the masonry work under Division 4 - "Unit Masonry", unless specifically noted otherwise.
- B.** For colored and noncolored mortars test for compressive strength by the methods of sampling and testing of ASTM C109 and ASTM C780.

1. Provide a minimum of one set of cubes for testing per 5,000 sq.ft. of masonry wall construction and as directed by Architect.
- C. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.
- D. If the compressive strength tests fail to meet the minimum requirements specified, the mortar represented by such tests will be considered deficient in strength.
- E. Deficient mortar shall be removed and replaced by the Contractor without additional cost to the Owner.

1.14 TESTS FOR GROUT:

- A. The Contractor for the Work of Division 4 - "*Unit Masonry*", shall cooperate with a separate testing laboratory to perform field quality control testing during the masonry work under the Division 4 specification, which covers "*Masonry Grout*", unless specifically noted otherwise.
- B. Grout for filling reinforced or unreinforced concrete masonry cores or brick cavities test for compressive strength by methods as described in Division 4 section covering - "*Masonry Grout*".
 1. Provide a minimum of one set of 3 test specimens for testing per 5,000 square feet of masonry wall construction or for each ready-mix truck load of grout and as directed by the Architect.
- C. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of Contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the reference specification for each material, specific location where material represented by sample is used, slump and compression test results. Indicate whether or not material is acceptable for intended use.
- D. If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests shall be considered deficient in strength.
- E. Deficient grout shall be removed and replaced by the Contractor without additional cost to the Owner.

1.15 TESTS OF CONCRETE MASONRY PRISMS:

- A. The Contractor for the work of Division 4 specification - "*Unit Masonry*", shall cooperate with a separate testing laboratory to

perform field quality control testing during the masonry work under Division 4 specification - "*Unit Masonry*".

- B. When required by the masonry plan, construct a set of 3 masonry prisms using mortar and concrete masonry units to be used in the masonry work. Unless otherwise noted, construct prisms 8 inches by 8 inches by 16 inches high (nominal) in compliance with ASTM E447, Method B.
- C. When prism tests are required to establish the strength of masonry in lieu of Masonry Inspection, provide a minimum of one set of 3 masonry prisms for testing for each 5000 sq.ft. (gross) of masonry wall construction.
- D. Submit written reports for each prism tested. Provide the project identification name and number, date of report, name of Contractor, name of testing service, name of material suppliers, specific location where masonry represented by the prism is used, compression test strength results, and specified required strength.
- E. If the compressive strength tests fail to meet the minimum strength specified in the Plans, the masonry represented by the tests shall be considered deficient.
- F. When tests indicating deficient masonry represent masonry already constructed, such masonry shall be removed and replaced by the Contractor without additional cost to the Owner. In lieu of removal and replacement, additional cores may be grouted as required and directed by the Architect without additional cost to the Owner.

1.16 MASONRY INSPECTION:

- A. Provide masonry construction inspection of concrete or brick masonry walls to insure that masonry construction is in conformance with the Contract Documents. Masonry inspection is required for those masonry elements, which must be constructed to attain high design strengths.
- B. Qualification of Inspection Agency: Refer to Section 01450 - "*Testing Laboratory Services*". Individual inspector shall be certified as a masonry construction inspector by the National Concrete Masonry Association or by a qualified state Masonry Institute or Association.
- C. Inspection shall use NCMA-TEK 18-3 Quality Assurance as a guideline.
- D. The individual or individuals who will perform the masonry inspection shall be present for the Pre-Masonry Conference.
- E. The masonry inspector shall prepare a written report or reports for each day of inspection. The format for this report shall be furnished by the Owner's Representative upon request.
- F. The masonry inspector shall be present and observe all masonry construction operations in walls requiring inspections. The masonry inspector shall be present at the project site within

sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

1.17 WELDING QUALITY CONTROL:

- A.** Welding operators shall be qualified under the provisions of the AWS Structural Welding Code on test pieces in positions and with clearances equivalent to those actually to be encountered in construction. Welders shall make only those types of welds for which they are specifically certified.
- B.** Welds requiring inspection shall be so indicated in the Drawings.
 - 1.** Welds indicated as requiring visual inspection shall be visually inspected by an independent inspector, acceptable to the Architect, prequalified by the American Welding Society Qualification Test.
- C.** The Contractor performing the welding requiring visual inspection shall coordinate with an independent testing service, acceptable to the Architect to perform weld testing.
- D.** Submit written reports for each weld tested. Provide project identification and number, date of report, name of Welding Contractor, name of testing service, location of weld, type of weld, and test results. Indicate whether or not weld is acceptable for intended use.
- E.** If by inspection welds fail to meet minimum acceptable criteria, the welds shall be cut out and replaced at no additional cost to the Owner.

1.18 BOLTED STRUCTURAL CONNECTIONS QUALITY CONTROL:

- A.** The Contractor for the work of the Division 5 specification for "*Structural Steel*" shall cooperate with a separate testing laboratory, to perform field quality control inspection of slip-critical and snug-tight bolted connections.
- B.** Inspection of slip-critical connections shall be visual. The inspector shall be present at the beginning of steel erection to insure that the erector is conforming to the Contract Documents and AISC Specifications. The inspector shall verify that the erector is marking the bolts and nuts prior to the turn-of-nut procedure. Ten percent of all slip-critical bolted connections shall be observed as they are installed. Any connections, which, in the opinion of the inspector, do not meet the tightening requirements of the Contract Documents, shall be corrected by the erector.
 - 1.** Inspection of snug-tight connections shall be made by use of a spud wrench. Ten percent of all snug-tight bolted connections selected randomly over the entire limits of the

building structure shall be tested to verify tightness. If more than 20 percent of the bolts tested do not meet the General Requirements of the Contract Documents, the erector shall be required to retighten all snug-tight bolted connections on the Project.

1.19 STRUCTURAL STEEL ALIGNMENT QUALITY CONTROL:

- A. The Contractor for the Work of the Division 5 specification section "*Structural Steel*", shall cooperate with a separate testing laboratory, to perform field measurement of structural steel beams, columns, joist, and deck alignment.
- B. Alignment shall be measured and compared to AISC "Code of Standard Practice for Steel Buildings and Bridges".
- C. The Testing Agency shall submit, to the Architect, a written report summarizing the measurements performed and the equipment used in the fieldwork. Where alignment fails to meet AISC requirements, the Contractor for the work in "Structural Metal Framing" shall make the required corrections.

1.20 COLD FORMED METAL FRAMING QUALITY CONTROL:

- A. The Contractor shall cooperate with a separate testing laboratory to perform field quality control inspections.
 - 1. Test and inspect cold formed metal framing used for exterior curtain wall system to verify framing meets the following specified and indicated items:
 - a. Thickness of framing members (gauge).
 - b. Spacing of framing members.
 - c. Attachment details of framing members to structural substrate.
 - d. Supplemental bracing and reinforcement is correctly provided including spacing, size and type of bracing and thickness of bracing.

1.21 PAINTING QUALITY CONTROL:

- A. The Contractor for the Work of Section 09900 - "*Painting*", shall cooperate with a separate testing laboratory to perform field quality control testing of painted finishes.
- B. Wet Film Thickness:
 - 1. Wet film thickness shall be tested at the rate of one reading per 1000 sq. ft. of painted surface. Ten random locations for readings will be chosen throughout building.
 - 2. Wet film thickness shall be as specified in Section 09900 - "*Painting*"; or if not specified, as specifically recommended by the paint manufacturer for the type of substrate, type of

paint and system used, and application methods and coverage requirements.

3. Testing Instrument:

- a. Wet Film Thickness Gage, KTA-Tator, Inc., Pittsburgh, PA.

C. Dry Film Thickness:

- 1. Dry film thickness shall be tested at the rate of 5 readings per 100 sq.ft. of painted surface. Twenty random locations for readings will be chosen throughout the building.
- 2. Average of all readings for a given area or surface area to be within the dry film thickness range specified in Section 09910 - Paints, and no individual reading should be more than 20 percent below the specified dry film thickness.
- 3. Testing instruments; shall be destructive or nondestructive type applicable for the type of substrate the coating is applied to. The following lists acceptable types of testing instruments:
 - a. Type 1, (Magnetic Pull-Off) Dry Film Thickness Gage, KTA-Tator, Inc., Pittsburgh, PA.
 - b. Fixed Probe Dry Film Thickness gage - Elcometer 345 Basic, KTA-Tator, Inc., Pittsburgh, PA.
 - c. Fixed Probe Dry Film Thickness Gage - Elcometer 345 Top, KTA-Tator, Inc., Pittsburgh, PA.
 - d. Fixed Probe Dry Film Thickness Gage Elcometer 300F-P2, KTA-Tator, Inc., Pittsburgh, PA.
 - e. Type II - Fixed Probe Dry Film Thickness Gage - Minitest 200F, KTA-Tator, Inc., Pittsburgh, PA.
 - f. Fixed Probe Dry Film Thickness Gage - Positector 6000-F1, KTA-Tator, Inc., Pittsburgh, PA.
 - g. Fixed Probe Dry Film Thickness Gage - Positector 6000-F3, KTA-Tator, Inc., Pittsburgh, PA.
 - h. Fixed Probe Dry Film Thickness Gage - Quanix 2200, KTA-Tator, Inc., Pittsburgh, PA.
 - i. Fixed Probe Dry Film Thickness Gage - Quanix 2300, KTA-Tator, Inc., Pittsburgh, PA.
 - j. Destructive Dry Film Thickness - Tooke Gage, KTA-Tator, Inc., Pittsburgh, PA.

1.22 STRUCTURAL TESTING AND SPECIAL INSPECTION CONFORMANCE IN COMPLIANCE WITH BUILDING CODE OF NEW YORK STATE:

- A. **General:** *In addition to the above Division 2-16 general testing requirements, the provisions of Chapter 17, "Structural Tests and Special Inspections" of the Building Code of New York State (BCNYS) additionally governs the quality, workmanship and requirements for all materials, as applicable. Materials of construction and tests shall conform to the applicable standards listed in the BCNYS.*
- B. **New Materials:** New building materials, equipment, appliances, systems or methods of construction not provided for in the BCNYS, and any material of questioned suitability proposed for use in the construction of a

building or structure shall be subjected to the tests prescribed in Chapter 17 of the *BCNYS*.

- C. **Used Materials:** The use of second-hand materials that meet the minimum requirements of Chapter 17 of the *BCNYS* shall be permitted.
- D. **Special Inspections** - All special inspections shall conform to the requirements of Section 1704 of Chapter 17 of the *BCNYS*. The Owner shall employ one or more Special Inspectors to provide inspections during construction on the types of work listed under Section 1704 of Chapter 17 of the *BCNYS*. The Special Inspector shall be a qualified person who shall demonstrate competence to the satisfaction of the code enforcement official for inspection of the particular type of construction or operation requiring special inspection. **Refer to Specification Section 01450, "Testing Laboratory Service" for the specific qualifications of the Special Inspector.**
- E. **Report Requirements:** Special inspectors shall keep records of all inspections, and shall furnish said records to the code enforcement official, to the Architect and the Owner. If a Construction Manager has been retained by the Owner, all test results shall be submitted in quadruplicate, via the Construction Manager. Reports shall indicate that work inspected was done in conformance to the approved Construction Documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the code enforcement official and to the Architect, prior to the completion of that phase of the work. A final report of inspections documenting required special inspections and corrections of any discrepancies noted in the inspections shall be submitted periodically at a frequency agreed upon by the Owner, the Architect and Construction Manager, prior to the start of the work.
- F. **Inspection of Fabricators:** Where fabrication of structural load bearing members and assemblies is being performed on the premises of a fabricator's shop, special inspection of the fabricated items shall be required by Section 17, and as required elsewhere in the *BCNYS*.
- G. **Fabrication and Implementation Procedures:** The special inspector shall verify that the fabricator maintains detailed fabrication and quality control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to the approved construction documents and referenced standards. The special inspector shall review the procedures for completeness and adequacy relative to the code requirements for the fabricator's scope of work.
- H. **Fabricator Approval:** Special inspections required by the *BCNYS* are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection. Approval shall be based upon the review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency. At the completion of fabrication, the approved fabricator shall submit a certificate of compliance to the code enforcement official, stating that the work was performed in accordance with the approved construction documents.

SPECIAL INSPECTIONS & TESTS – The table below summarizes the special inspections & testing requirements of the contract, in conformance with BCNYS 1704.1.1. The Owner shall pay for all Special Inspections & Tests indicated below. (Note: This chart includes all items indicated within the BCNYS as requiring special inspections. These inspections shall be performed for all work items that are included within the project scope of work. If there is testing indicated for a material or component that is not required on the project, then it follows that there is no testing required for that item on the particular project in question.)

A. Soils				1704.7
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) (Table 1704.7 – Required Verification and Inspection of Soils)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
1. Verify materials below footings are adequate to achieve the design bearing capacity.		X		1704.7
2. Verify excavations are extended to proper depth and have reached proper material.		X		1704.7
3. Perform classification and testing of controlled fill materials.		X		1704.7
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X			1704.7
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.		X		1704.7
B. Foundation and Soil Investigations				1802.2
1. Questionable soil.	X			1802.2.1
2. Expansive soil.		X		1802.2.2
3. Groundwater table.		X		1802.2.3
4. Pile and pier foundations.	X			1802.2.4
5. Rock strata.		X		1802.2.5
6. Seismic Design Category C.		X		1802.2.6
7. Seismic Design Category D, E, F.		X		1802.2.7
C. Soil Classification		X		1802.3
D. Concrete Construction (per NYSBC Table 1704.4)				1704.4
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) (Table 1704.4 – Required Verification and Inspection of Concrete Construction)	CONTINUOUS	PERIODIC	REFERENCE STANDARD (where applicable, see also Section 1707.1, special inspections for seismic resistance)	BCNYS REFERENCE
1. Inspection of reinforcing steel, including prestressing tendons and placement.		X	ACI 318; 3.5, 7.1-7.7	1913.4
2. Inspection of reinforcing steel welding, in accordance with Table 1704.3, Item 5B of BCNYS.			AWS D1.4, ACI 318; 3.5.2	

3. Inspection of bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased.	X			1911.5
4. Verify use of required design mix.		X	ACI 318; Ch.4, 5.2-5.4	1904.2.2, 1913.2, 1913.3
5. At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X		ASTM C172, ASTM C31; ACI 318; 5.6, 5.8	1913.10
6. Inspection of concrete and shotcrete placement for proper application techniques.	X		ACI 318; 5.9, 5.10	1913.6, 1913.7, 1913.8
7. Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318, 5.11, 5.13	1913.9
8. Inspection of prestressed concrete: a. Application of prestressing forces. b. Grouting of bonded prestressing tendons in the Seismic-force-resisting system.	X X		ACI 318; 18.20: ACI 318; 18.18.4	
9. Erection of precast concrete members.		X	ACI 318; Ch. 16	
10. Verification of in-situ concrete strength prior to stressing of tendons in posttensioned concrete and prior to removal of shores and forms from beams and structural slabs.		X	ACI 318; 6.2	
11. Inspect formwork for shape, location and dimensions of the concrete member being formed.		X	ACI 318; 6.1.1	
E. Pile Foundations: Installation and load tests.				1704.8
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) (Table 1704.8 – Required Verification and Inspection of Pile Foundations)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
1. Verify pile materials, sizes and lengths comply with requirements.	X			
2. Determine capacities of test piles and conduct additional load tests, as required.	X			
3. Observe driving operations and maintain complete and accurate records for each pile.	X			
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document and pile damage.	X			
5. For steel piles, perform additional inspections in accordance with Section 1704.3.				1704.3
6. For concrete piles and concrete filled piles perform additional inspections in accordance with Section 1704.4				1704.4
7. For specialty piles, perform additional inspections as determined by the registered design professional in				

responsible charge.				
8. For augured uncased piles and caisson piles, perform inspections in accordance with Section 104.9				1704.9
F. Pier Foundations: Seismic Design Category C, D, E, F				1704.9
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) (Table 1704.9 – Required Verification and Inspection of Pier Foundations)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
1. Observe drilling operations and maintain complete and accurate records for each pier.	X			
2. Verify placement locations and plumbness, confirm pier diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end bearing strata capacity.	X			
3. For concrete piers, perform additional inspections in accordance with Section 1704.4				1704.4
4. For masonry piers, perform additional inspections in accordance with Section 1704.5				1704.5
G. Masonry Construction				
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) L1 = Level 1 Inspection required for empirically designed & nonessential facilities. (Per NYSBC Table 1704.5.1)	CONTINUOUS	PERIODIC	ACI 530/ASCE5 / TMS 402, BCNYS Ch. 35	ACI 530.1/ASCE6 / TMS 602, BCNYS Ch. 35 BCNYS REFERENCE
1. As masonry construction begins, the following shall be verified, to ensure compliance:				
a. Proportions of site-prepared mortar.		X		2.6A
b. Construction of mortar joints.		X		3.3B
c. Location or reinforcement, connectors, prestressing tendons and anchorages.		X		3.4, 3.6A
d. Prestressing technique.		X		3.6B
e. Grade and size of prestressing tendons and anchorages.		X		2.4B, 2.4H
2. The Inspection Program shall verify:				
a. Size and location of structural elements.		X		3.3G
b. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.		X	1.2.2(e), 2.1.4, 3.1.6	
c. Specified size, grade and type of reinforcement.		X	1.13	2.4, 3.4
d. Welding of reinforcing bars.	X		2.1.10.7.2, 3.3.3.4(b)	
e. Protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F)		X		1.8C, 1.8D 2104.3, 2104.4
f. Application and measurement of prestressing force.		X		3.6B
3. Prior to grouting, the following shall be verified to ensure compliance:				
a. Grout space is clean.		X		3.2D
b. Placement of reinforcement and connectors and		X	1.13	3.4

prestressing tendons and anchorages.					
c. Proportions of site prepared grout and prestressing grout for bonded tendons.		X		2.6B	
d. Construction of mortar joints.		X		3.3B	
4. Grout placement shall be verified to ensure compliance with code and construction document provisions.	X			3.5	
a. Grouting of prestressing bonded tendons.	X			3.6C	
5. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	X			1.4	2105.2.2, 2105.3
6. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.		X		1.5	
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) L2 = Level 2 Inspection required for essential facilities. See 1704.5 for clarification. (Per NYSBC Table 1704.5.3)	CONTINUOUS	PERIODIC	ACI 530/ASCE5 / TMS 402, BCNYS Ch. 35	ACI 530.1/ASCE6 / TMS 602, BCNYS Ch. 35	BCNYS REFERENCE
1. From the beginning of masonry construction, the following shall be verified to ensure compliance:					
a. Proportions of site-prepared mortar, grout and prestressing grout for bonded tendons.		X		2.6A	
b. Placement of masonry units and construction of mortar joints.		X		3.3B	
c. Placement of reinforcement, connectors and prestressing tendons and anchorages.		X	1.13	3.4, 3.6A	
d. Grout space prior to grouting.	X			3.2D	
e. Placement of grout.	X			3.5	
f. Placement of prestressing grout.	X			3.6C	
2. The Inspection Program shall verify:					
a. Size and location of structural elements.		X		3.3G	
b. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.	X		1.2.2(e), 2.1.4, 3.1.6		
c. Specified size, grade and type of reinforcement.		X	1.13	2.4, 3.4	
d. Welding of reinforcing bars.	X		2.1.10.7.2, 3.3.3.4(b)		
e. Protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F)		X		1.8C, 1.8D	2104.3, 2104.4
f. Application and measurement of prestressing force.	X			3.6B	
3. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	X			1.4	2105.2.2, 2105.3
4. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.		X		1.5	
H. Steel Construction (per NYSBC Table 1704.3)					

INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS) (Table 1704.3 – Required Verification and Inspection of Steel Construction)	CONTINUOUS	PERIODIC	REFERENCE STANDARD (where applicable, see also Section 1707.1, special inspections for seismic resistance)	BCNYS REFERENCE
1. Material verification of high-strength bolts, nuts & washers:				
a. Identification markings to conform to ASTM standards specified in the approved construction documents.		X	Applicable ASTM material specifications. AISC 360, Section a3.3	
b. Manufacturer's certificate of compliance required.		X		
2. Inspection of high-strength bolting:				
a. Bearing-type connections.		X	AISC 360, Section M2.5	1704.3.3
b. Slip-critical connections.	X	X		
3. Material verification of structural steel:				
a. Identification markings to conform to ASTM standards specified in the approved construction documents.			ASTM A6 or A568	1708.4
b. Manufacturer's certified mill test reports.			ASTM A6 or A568	
4. Material verification of weld filler materials:				
a. Identification markings to conform to AWS specification in the approved construction documents.			AISC 360, Section A3.5	
b. Manufacturer's certificate of compliance required.				
5. Inspection of welding.				
a. <u>Structural Steel</u> :				
1) Complete & partial penetration groove welds.	X		AWS D1.1	1704.3.1
2) Multi-pass fillet welds.	X			
3) Single-pass fillet welds > 5/16"	X			
4) Single-pass fillet welds < 5/16"		X		
5) Floor and deck welds.		X		
b. <u>Reinforcing Steel</u> :				
1) Verification of weldability of reinforcing steel other than ASTM A706.		X	AWS D1.4, ACI 318:3.5.2	
2) Reinforcing steel-resisting flexural & axial forces in intermediate and special moment frames, and boundary elements of special reinforced concrete shear walls & shear reinforcement.	X			
3) Shear Reinforcement.	X			
4) Other reinforcing steel.		X		
6. Inspection of steel frame joint details for compliance with approved construction documents:		X		
a. Details such as bracing & stiffening.				1704.3.2
b. Member locations.				
c. Application of joint details at each connection.				
I. Wood Construction: Fabrication of wood structural elements & assemblies.				1704.6, 1704.2
J. Sprayed Fire-Resistant Materials				1704.10
1. Structural member surface conditions.				1704.10.1
2. Application.				1704.10.2
3. Thickness.			ASTM E 605	1704.10.3

4. Density.			ASTM E 605	1704.10.4
5. Bond Strength.			ASTM E 736	1704.10.5
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
K. Mastic and intumescent fire-resistant coatings			AWCI 12-B	1704.11
L. Exterior Insulation and Finish Systems (EIFS)				1704.12
M. Special Cases (unusual in it's nature)				1704.13
N. Smoke Control Systems (Ductwork)				1704.14
O. Special Inspections for Seismic Resistance: Applicable to specific structures, systems and components (Seismic Category C, D, E, F) **				1707
1. Structural steel (welding).	X		AISC 341	1707.2
2. Structural wood.	X	X		1707.3
3. Cold-formed steel framing.		X		1707.4
4. Pier Foundations				
a. During placement of reinforcement.		X		1707.5
b. During placement of concrete.	X			
5. Storage racks & access floors.		X		1707.6
6. Architectural components.		X		1707.7
7. Mechanical & electrical components.		X		1707.8
8. Designated seismic system verifications.				1707.9, 1708.5
9. Seismic isolation system.		X		1707.10
P. Structural Testing for Seismic Resistance: Applicable to specific structures, systems and components. (Seismic Category C, D, E, F) **				1708
1. Testing and verification of masonry materials and assemblies. (Level 1, 2 or 3)				1708.1
2. Testing for seismic resistance.				1708.2
3. Reinforcing and prestressing steel.			ACI 318, ACI 318:3.5.2	1708.3,
4. Structural steel.			AISC 341; AWS D1.1, ASTM A435, A898	1708.4
5. Mechanical & electrical equipment.				1708.5
6. Seismically isolated structures.			Section 17.8 ASCE 7	1708.6
INSPECTION AND TESTING (Continuous & Periodic is as defined by the BCNYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
Q. Structural Observations: Applicable to specific structures. (Seismic Category C, D, E, F) **				1709

R. Design Strengths of Materials			All design strengths and permissible stresses of any structural materials shall conform to the specifications and methods of design of accepted engineering practice or the approved rules in the absence of applicable standards.	1710.1
a. New Materials			For materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests as provided for in Section 1711.	1710.2; 1711
S. Alternative Test Procedures			Provide duly authenticated reports from approved agencies in respect to the quality & manner of use of new materials or assemblies as provided for in Section 104.11. Costs of all tests and other investigations required under the provisions of this code shall be borne by the Owner.	1711.1
T. Test Safe Load				1712.1
U. In-Situ Load Tests (Completed Building or Structure)				1713.1, NYSBC Chapter 35
V. Preconstruction Load Tests (Structural Adequacy)				1714, NYSBC Chapter 35
a. Load Test Procedures specified				1714.2
b. Load Test Procedures not specified				1714.3
c. Wall and partition assemblies				1714.4
d. Exterior window & door assemblies				1714.5
e. Test Specimens				1714.6
W. Material & Test Standards				1715
a. Joist Hangers & Connectors				1715.1
b. Concrete and Clay Roof Tiles				1715.2
X. Other (List)				
End				

**** - For Seismic Classification, see Code Analysis located within the Construction Drawings.**

Note: For projects utilizing a Construction Manager, the Construction Manager's involvement with Special Inspections and Testing shall be limited to documenting, witnessing, acquiring and filing copies of all reports prepared by the Special Inspectors and testing agencies, and sequentially transmitting copies of the reports to the Architect and the Owner. All reports shall be prepared and certified by the Special Inspector and Testing Agency in accordance with criteria established by, and in a format approved by, the Architect/Engineer, in complete conformance with the requirements of BCNYS Chapter 17, Section 1704. Where no Construction Manager is retained,

coordination and documentation of tests shall be the sole responsibility of the Prime Contractor responsible for the work being tested, in conjunction with the testing agency's Special Inspector.

1.23 QUALITY ASSURANCE FOR WIND REQUIREMENTS:

A. Each of the main wind force-resisting systems that are identified within the construction documents are subject to special inspections and testing, in accordance with Section 1704 and other applicable sections of the Building Code of New York State.

B. Wind force-resisting systems include the following; (refer to construction documents for more specific information concerning systems contained within a specific project.)

1. Roof cladding and roof framing connections;
2. Wall connections to roof and floor diaphragms and framing.
3. Roof and floor diaphragm systems, including collectors, drag struts and boundary systems.
4. Vertical windforce-resisting systems, including braced frames, moment frames and shear walls.
5. Windforce-resisting system connections to the foundation.
6. Fabrication and installation of components and assemblies required to meet the impact resistance requirements of Section 1609.1.4 of the BCNYS.

Exception: Fabrication of manufactured components and assemblies that have a label indicating compliance with the wind-load and impact-resistance requirements of the BCNYS.

C. Special inspections and testing, observations, frequency and distribution of reports shall be as indicated within other areas of this section.

D. **Contractor Responsibility:** Each contractor responsible for the construction of a main wind force-resisting component listed in the quality assurance plan shall submit a written contractor's statement of responsibility to the code enforcement official and to the Owner prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain the following:

1. Acknowledgement of awareness of the special requirements contained in the quality assurance plan;
2. Acknowledgement that control will be exercised to obtain conformance with the construction documents approved by the code enforcement official;
3. Procedures for exercising control within the contractor's organization, the method and frequency of reporting, and the distribution of the reports;
4. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

1.24 SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE (Section 1707 of BCNYS):

- A. Special Inspections for Seismic Resistance:** Special inspection as specified herein is required for the following, where required in Section 1704.1 of BCNYS. Special inspections itemized in Sections 1707.2 through 1707.8 of the BCNYS are required for the following:
1. The seismic-force-resisting systems in structures assigned to Seismic Design Category C, D, E or F, as determined in Section 1616 of the BCNYS.
 2. Designated seismic systems in structures assigned to Seismic Design Category D, E or F.
 3. Architectural, mechanical and electrical components in structures assigned to Seismic Design Category C, D, E or F that are required in Sections 1707.6 and 1707.7 of the BCNYS.
- B. For Seismic Classification specific to this project,** see Code Analysis located within the Construction Drawings.

PART 2 - PRODUCTS - (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 - REPAIR AND PROTECTION:

- A. General:** Upon completion of inspection, testing, sample-taking and similar services performed on Work, repair damaged work and restore substrates and finishes to eliminate deficiencies including defects in visual qualities of exposed finishes. Except as otherwise indicated, comply with the requirements of the "Cutting and Patching" specification. Protect work exposed by or for service activities and protect repaired work. Repair and protection is the Contractor's responsibility, regardless of assignment of responsibility for inspection, testing or similar service.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Construction facilities provided by Prime Contractor as required by Prime Contract:
 - a. Temporary utilities:
 1. Temporary sanitary facilities.
 - b. Construction aids:
 1. Temporary ramps, ladders, and runways.
 2. Material lifting equipment (i.e. hoists, cranes, and similar items).
 3. Temporary scaffolding and platforms.
 - c. Barriers:
 1. Temporary enclosures and barricades, including protection for existing trees and plants to remain.
 2. Temporary enclosures and barricades within existing building.
 - d. Controls:
 1. Construction cleaning and rubbish removal, including providing and maintaining rubbish chutes and rubbish containers.
 2. Dust control, erosion and sediment control, and noise, pest, and pollution control.
 - e. Other temporary equipment, facilities, controls, and similar items required to complete contract requirements or specified in other section of project manual.

B. Placement, Relocation, and Removal:

1. Unless otherwise directed by the Project Representative, locate construction facilities and temporary controls to avoid interference with the work of this project, future projects indicated in the Contract Documents, and the Owner's activities on site.

2. Should change in location of construction facilities and temporary controls be necessary, relocation shall be accomplished by Prime Contractor providing facility or control without addition cost to Owner.
3. When no longer required, each Prime Contractor shall remove construction facilities and temporary controls provided by the Prime Contractor and shall remove all debris and restore area to original conditions, unless otherwise indicated in the Contract Documents.

1.02 TEMPORARY UTILITIES

- A. Sanitary Facilities: The Owner will not allow the use of toilets within the building. The GC shall provide temporary toilet facilities for use by all trades during the course of the work. The GC shall maintain the temporary toilet facilities in sanitary condition for the duration of the contract, and, upon completion of the work, remove them from the site.
- B. Telephone Service: Owner's telephones are not available for use by Contractor personnel.
 1. Public telephones within existing buildings are available for use by Prime Contractor personnel.

1.03 CONSTRUCTION AIDS

- A. Installation and maintenance for construction aids in accordance with applicable New York State Labor Laws, OSHA regulations, and other federal, state, and local laws, and maintenance of construction aids in safe condition shall remain exclusive responsibility of Prime Contractor providing construction aid.
- B. Ramps, Ladders, and Runways:
 1. Comply with New York State Labor Laws, OSHA regulation, and other applicable federal, state, and local laws.
 2. Remove as soon as possible and replace with permanent facilities where appropriate.
- C. Material Lifting Equipment: Provide equipment as required complying with New York State Labor Laws, OSHA regulations, and other applicable federal, state, and local laws.
- D. Scaffolding and Platforms: Provide equipment as required complying with New York State Labor Laws, OSHA regulations, and other applicable federal, state, and local laws.
- E. Rubbish Chutes:
 1. Install and maintain wooden to steel chute(s) terminating in hopper or rubbish container, properly fastened to building, and enclosed over full length with openings as required for access.

2. Provide protective covering for building wall beneath and at least 2 ft. on both sides of chute extending full length of chute.

1.04 BARRIERS AND ENCLOSURES

- A. Interior Temporary Partitions and Closures: Provide temporary partitions and ceilings as required to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture from construction areas into Owner-occupied areas, and to prevent damage to existing areas and equipment.
 1. Construction with steel studs and 1/2" thick gypsum board on both sides with taped joints.
 2. Locate partitions as shown on drawings; if not shown on drawings, review location of partitions with the Architect and the Owner before beginning installation.
- B. Removal: Upon completion of construction at site, remove barriers, fencing, and closures/enclosures, and patch existing surfaces to match adjacent undisturbed surfaces.

1.06 TEMPORARY CONTROLS

- A. Construction Cleaning and Rubbish Removal:
 1. Provide continuous cleaning of rubbish, construction debris, and waste material resulting from construction work; place rubbish chutes or covered containers, located convenient to Prime Contractor's construction areas as approved by Owner.
 - a. Definition of "rubbish, construction debris, and waste materials": Material not intended or necessary for completion of the project, including, but not limited to, such as packing materials, lunch papers, drinking cups, and similar items.
 - b. Frequency of cleaning: At least daily during construction, clean up rubbish, construction debris, and waste materials around bottom of chutes or containers, within structure, and around site and access routes.
 - c. Comply with local and state ordinances, regulations, and laws, and with OSHA anti-pollution laws regarding clean up and disposal operations.
 - d. Where surfaces are to be cleaned, use materials recommended by manufacturer.
 - e. Remove debris and rubbish from pipe chases, plenums, attics, and crawl spaces prior to closing space.
 - f. Vacuum clean interior areas prior to start of surface finishing and continuous cleaning as required as finishing

progresses.

- g. Control cleaning operations so that dust and other particulates will not adhere to wet or newly-coated surfaces. Sprinkle dust rubbish with water.
- 2. Lower waste material in controlled manner with as few handlings as possible; do not drop or throw from heights.
- 3. At least once a week, remove from site all rubbish, construction debris, and waste materials, including contents of containers, and dispose of legally.
 - a. Remove rubbish, construction debris, and waste materials more frequently if such materials present hazard or interfere with construction of other Prime Contractors.
 - b. Do not burn or bury rubbish, construction debris, and waste materials on site.
 - c. Do not dispose of volatile fluid waste (i.e. mineral spirits, oil, paint thinner, and similar materials) in storm or sanitary sewer systems or into streams or waterways.
- B. Dust Control: Provide methods to minimize raising dust from construction operations. Provide positive means to prevent airborne dust from dispersing into atmosphere.
- C. Fire Protection and Prevention:
 - 1. Store volatile waste in covered metal containers and remove from premises daily in compliance with local and state ordinances and laws and with OSHA requirements.
 - 2. Locate and maintain gasoline and fuel oil storage facilities in full compliance with local and state ordinances and laws with OSHA requirements.
 - 3. Take all precautions required to prevent fires as a result of construction operations; operate flame cutting torches, blow torches, welding tools, and similar equipment in strict accordance with applicable safety rules and regulations.
 - a. Prime Contract using welding tools or torches of any type shall provide and maintain in usable condition at all times in the immediate vicinity of operations a fire extinguisher of the "Multi-Purpose Type ABC".
 - 4. Each Prime Contractor shall provide fire extinguishers in working order located at intervals throughout construction operations which shall not be removed from their mounting except to be tested or for purpose of fighting fire.
 - a. Relocate as necessary as work progresses.
 - b. Fire extinguishers remain the property of the Prime Contractor providing them.

- D. Vehicle Parking: Locate vehicles used on project site in locations which will not introduce exhaust gases into portions of building occupied by Owner and not involved in the project.

1.07 FIELD OFFICES AND SHEDS

A. Contractor's Field Offices and Sheds:

1. Each Prime Contractor shall provide and maintain such offices, storage sheds, and similar temporary buildings and trailers on site as required for his own use.
 - a. Existing grass or paved areas at the site shall be designated by Owner as Prime Contractor staging area, including location of material storage and field offices: review requirements with Owner prior to moving onto site.
 - b. Prime Contractors are advised that space within existing buildings will not be available for their use for storage of materials or similar uses.
2. Upon completion of construction at site, remove offices, storage sheds, and similar temporary buildings and trailers in site and patch existing surfaces to match adjacent undisturbed surfaces.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01550 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provision of Contract, including General and Supplementary Conditions and Division 1 - Specification Sections, apply to work of this Section.
- B. The work must comply with the requirements of the following related specifications sections when applicable:
 - 1. Division 1 Section 01050 - *"Uniform Safety Standards for School Construction and Maintenance Projects - Commissioner's Regulations"*
 - 2. Division 1 Section 01352 - *"LEED Requirements"* for additional LEED requirements. *(For LEED Certified Projects)*
 - 3. Division 1 Section 01524 - *"Construction Waste Management"* for recycling construction waste. *(For LEED Certified Projects)*

1.02 DESCRIPTION OF WORK

- A. Extent of selective demolition work is indicated on drawings and/or specified herein.

1.03 SUBMITTALS

- A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's Representative for review and approval prior to commencement of work.
- B. See Section 01524 for additional submittal requirements for LEED Projects.

1.04 JOB CONDITIONS

- A. Occupancy: Owner will be occupying areas of the building immediately adjacent to areas of selective demolition. Demolition work must be conducted in a manner to minimize disruption of normal Owner's operations.
- B. Exits: All exits must be kept clear and maintained.
- C. Protection: Provide temporary barricades and other forms of protection as required to protect Owner's personnel, staff and General Public from injury due to selective demolition work and new construction.
 - 1. Prevent dust and dirt from rising and entering the building.
 - 2. Protect adjacent floor areas with suitable coverings.

- D. All work in an Educational Facility must comply with the Commissioners Regulations and Uniform Safety Standards for School Construction and Maintenance Projects. Reference Section 01050 for additional information.
- E. Project Waste: All project waste and rubbish to be disposed in containers provided by the Contractor for subsequent legal off site disposal in accordance with Specifications Sections 01352 and 01524. Container locations to be coordinated with the Owner. Off site disposal must be on a regular basis.
- F. Damage: Promptly repair or replace areas that are to remain and are damaged by demolition or removal work.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which work of this Section will be performed for any interferences, or conditions which will be detrimental to timely and proper completion of the work.
- B. Report any interferences or unsatisfactory conditions to the Architect in writing. Do not proceed until interferences or unsatisfactory conditions have been removed or corrected.

3.02 PREPARATION

- A. Erect and maintain dust-proof closures to prevent the spread of dust to adjacent areas.

3.03 DEMOLITION

- A. Perform selective demolition work in a systematic manner.

3.04 DISPOSAL OF DEMOLISHED MATERIALS

- A. Each day, remove debris, rubbish, and other materials resulting from demolition operations from building in accordance with Specifications Sections 01352 and 01524. Material to be disposed in containers provided by the Contractor. (*For LEED Certified Projects*)

3.05 CLEAN UP

- A. Upon completion of demolition work, remove tools, equipment and all remaining demolished materials from site. Leave areas broom clean.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01600 - ASBESTOS WORK UNDER THIS CONTRACT

1.01 ASBESTOS HAZARD

- A. The disturbance and dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with content of the training session on asbestos control work, the Contractor shall appraise all of his workers, supervisory personnel, subcontractors, and consultants who will be at the job site of the seriousness of the hazard and of proper work procedures which must be followed.
- B. Where in the performance of the workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified asbestos-containing materials, appropriate, continuous measures as necessary to protect all building occupants from the hazard of exposure to airborne asbestos shall be taken.
- C. If found in non-compliance with these specifications, the Contractor will be served a written notice to this effect. This written notice will serve as a warning. Further non-compliance of these specifications of safety regulations will be cause of cancellation of contract.

1.02 WORK INCLUDED

- A. The work under this section shall include all labor, materials, equipment, and performance of all operations in connection with the abatement of asbestos containing materials, completely in accordance with the applicable drawings, specifications, and governing code authorities.
- B. The following list of items is to be used as a guide to the Contractor and shall not be considered as limiting the scope of work.
 - 1. Contractor shall visit the site and become thoroughly acquainted with the scope of work prior to bidding.
 - 2. Do all cutting and patching as required.
 - 3. Obtain all inspections and permits, and pay all required fees.
 - 4. Provide and install new non-asbestos materials to replace asbestos materials removed, unless otherwise noted.
 - 5. All removal work shall be done under negative pressure with HEPA-filtered, powered exhausts.
 - 6. All areas shall be damp cleaned after all removal work has been completed.

7. A copy of the Notification Letter from Contractor to the U.S. E.P.A., from the Contractor to the New York State Department of Labor, Division of Safety and Health Asbestos control Program, dump receipt and waste manifest shall be sent to the Engineer for review prior to final payment.
8. All areas containing asbestos shall have a surfactant (wetting agent), similar to amended water, applied to all surfaces.
9. All E.P.A., OSHA, N.Y.S. Department of Labor Industrial Code Rule 56 and Department of Health regulations and guidelines shall be strictly adhered to, including all provisions of these specifications. Any modifications must be authorized in writing and incorporated exactly as specified.
10. Contractor shall be permitted to use the "glove/bag" method for asbestos removal where applicable if accomplished in accordance with all regulations.
11. The Contractor shall make provisions for the possibility of the heating system remaining on during the course of the work.
12. All existing finishes contiguous to the work area and inclusive of the work area shall be restored to original condition. Any damage caused under this contract shall be repaired by the Contractor (e.g. paint peeled off by barrier tape, nail holes, water damage, broken glass, etc.), at no additional cost to the building owner.
13. Any furniture, equipment, or materials moved during the course of this contract shall be placed back to its original position. These materials shall be pre-abatement cleaned before removal from the work area as per Code Rule 56, Section 56-8.1.
14. Contractor shall provide the Engineer with copies of certificates issued by the New York State Labor Department and EPA-AHERA.
15. Notify, on forms provided by the New York State Labor Department, both the Labor Department and the EPA 10 days prior to the commencement of work.
16. Licensed waste haulers shall be used.
17. Contractor shall be responsible for all OSHA air testing. The Owner will contract an independent testing laboratory for all other air monitoring, including TEM clearance samples.
18. Contractor shall provide and post near or within the abatement project clean room a written emergency procedure program in each appropriate language signed by each worker.

19. Any electrical service contained in the abatement areas either shall be completely shut down and locked out or critically barriered to remain outside the abatement area. Temporary electrical power shall be brought in from outside the abatement area with ground fault interruption protection furnished at the source. Power source shall be secured to avoid accidental shutdown of negative air infiltration equipment. If necessary, Contractor shall provide for an exterior separately generated power source.
20. Contractor shall post all supervisor and worker accreditations, owners, monitoring firms, and designers phone numbers, company's written respiratory protection program, written emergency procedures, project log book, and written notification to the occupants of the building 10 days prior to the commencement of work as required by code.
21. A copy of the log book, waste manifests, and dump receipts shall be submitted to the Owner prior to job completion and sign off.
22. A copy of the standard operating procedure, employee protection plan, OSHA medical monitoring, and respiratory training and protection plan shall be submitted to the Owner prior to work start up.
23. Contractor shall be GPAC approved or shall furnish an engineering specification for any equal system proposed for use.
24. Contractor shall provide separate filtered sump pump systems for drainage of all areas as required to remove waste water. Filtration system shall assure a minimum of five micron effectiveness.
25. For work above hung ceiling, perimeter tiles shall be removed under full containment and all walls properly sealed and plasticized up to the deck. This shall include critical barriers on all openings in wall and deck above hung ceiling. Ceiling can then be removed and abatement completed.
26. Contractor shall comply with all U.L. Labor Department and OSHA fire safety regulations including 29 CFR 1910 and 1926.
27. Fixed objects and other items which are to remain in the work area shall be pre-cleaned and plasticized as per code.
28. The entire work area shall be precleaned as per code.
29. All plastic sheeting used shall be of the fire retardant type.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01611 - TEST LABORATORY SERVICES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work includes the testing and monitoring for Contractors employees:
 - 1. Contractor shall submit the name of the testing laboratory he intends to employ for approval by the Architect, and
 - 2. Cooperate fully with selected testing laboratory and all others responsible for testing and inspecting the work.
 - 3. Costs of testing during removal shall be in accordance with OSHA regulations and paid for by the Contractor.
- B. Related work specified elsewhere:
 - 1. Requirements for testing are described herein and in other Sections of these Specifications.
 - 2. Payment for monitoring and final air testing will be made by the Owner.

1.02 AIR MONITORING

- A. Through the entire asbestos-control operation and project decontamination, air monitoring shall be conducted to insure compliance with OSHA and New York Department of Labor regulations. Air monitoring shall be conducted as prescribed by Section 1910.1001 (F)3 of OSHA and Sub-part 56-17 of Department of Labor, New York State regulations.

1.03 LABORATORY TESTING

- A. The services of an approved independent testing laboratory shall be employed to perform laboratory analysis of the air samples as prescribed by Section 1910.1001(E) of OSHA regulations and N.Y.S. Department of Health 502. Submit for approval of the Architect/Engineer, the name of the laboratory. Approval must be obtained prior to commencing the asbestos-control work. A complete record, certified by the testing laboratory, all air monitoring tests and results shall be furnished to the Architect/Engineer and the Board of Education.

1.04 COST OF TESTING

- A. Asbestos project air sampling and analysis requirements shall be as following:
 - 1. *The cost of OSHA air monitoring shall be included in the Contractor's bid.*

2. *The cost of any background, TEM clearance, or any additional monitoring shall be borne by the Owner.*
 3. *Should the clearance samples come back above permissible levels, the cost of any additional required air sampling shall be paid by the Contractor, including monitoring fees.*
 4. *Any additional cost for quick turnaround air testing due to the Contractor's failure to meet specified completion dates shall be borne by the Contractor, including monitoring fees.*
 5. *Should the Contractor notify the hygienist that the work area is ready for inspection, any work site which is either not prepared properly or fails the inspection shall be reinspected at the Contractor's expense.*
 6. All air sampling technician and project monitor certificates shall be posted at all times.
 7. All laboratories used shall be accredited by the AIHA or by the New York State Department of Health for the selected methodology of sampling and analysis of asbestos.
 8. The contractor shall note that the Architect/Engineer (Project Designer) **is not** the Project Monitor on this project. The Project Monitor will be assigned or handled by the Owner.
- B. Through the length of the project, the monitoring firm shall conduct inspections to perform both barrier air monitoring as well as procedural inspections.

<u>Pre-Abatement</u> (Area Preparation)	<u>Abatement</u> (Work in Progress)	<u>Post-Abatement*</u> (Clearance Air Monitoring)
PCM	PCM	TEM, PCM

*Aggressive Air Sampling Techniques shall be used.

Final Clearance Transmission Electron Microscopy (TEM) shall show the average fiber concentration as per 40 CFR Part 763, Sub-Part E, Appendix A, as below 70 structures per square millimeter (705/mm²).

1.05 QUALITY ASSURANCE

A. Qualifications of Testing Laboratory:

The Contractor shall employ an Industrial Hygienist or Laboratory to conduct air testings. They shall be selected from the latest Interim Listing of Commercial Laboratories prepared by Research Triangle Institute, Research Triangle Park, N.C. 27709.

B. Codes and Standards:

1. Air testing shall be in accordance with EPA and the requirements of Section 0910.1001 (a) and (f) and 1926 of the OSHA 2206 regulations.

2. Analysis of contaminated filters shall be in accordance with NIOSH method using phase contrast microscopy. Membrane filter shall be 37-mm diameter, open face.
3. Testing Laboratory shall be from the approved list of firms of the Environmental Laboratory Approved Program of the New York State Health Department.

1.06 SUBMITTALS

A. Test Reports:

1. Promptly process and distribute three (3) copies of the test results, to the Architect.
2. Prompt reports are necessary so that, if required, modifications to work methods and/or practices may be implemented as soon as possible.
3. The contractor shall verbally notify the Architect within 24 hours of the results of each test, followed by written notification within three days.

1.07 PAYMENT FOR FINAL AIR TESTING

A. Final Air Testing Costs:

All cost for the first final air testing following clean-up as required by this contract shall be paid for by the Owner.

B. Re-testing:

Should air tests (following final clean-up) indicate a fiber count greater than .01 fibers per cubic cm. in any of the building areas, the Contractor shall re-clean the specific area. The Owner will then have the area re-tested. ***All costs of such re-testing will be at the Contractor's expense.***

1.05 CONTRACTOR'S TESTING

- A. Inspecting and testing performed exclusively for the Contractor's convenience and to assure compliance with Section 1910.1001 and of the OSHA Regulations, shall be the sole responsibility of the contractor. ***The cost thereof shall be deemed included in the bid price.***

PART 2 - EXECUTION

2.01 COOPERATION WITH TESTING LABORATORY

- A. Representative of the Testing Laboratory shall have access to the work area at all times. The Contractor shall provide facilities for such access in order that the Laboratory may properly perform its function.

2.02 TAKING SPECIMENS

- A. Specimens and samples for testing shall be taken by the testing personnel. Sampling equipment and personnel will be provided by the Testing Laboratory. Deliveries of specimens and samples to the Testing Laboratory will be performed by the Testing Laboratory.
- B. Air samples shall be taken as follows:

<u>Area to be Sampled</u>	<u>When</u>	<u>Each Area</u>	<u>Minimum Sample Volume in Liters</u>	<u>Collection Rate</u>
Work Area	During removal or encapsulation work	Daily (4 per 8 hr. work shift)	120	@ 2 LPM
Area Immediately Adjacent to Work Areas	During removal or encapsulation work	Daily (4 per 8 hr. work shift)	1200	@ 10 LPM
Work Area	During sealing containment work	NONE REQUIRED	NONE REQUIRED	NONE REQUIRED
Work Area	48 hours after final clean-up, all projects (prior to removal of containment barriers)	One	1200	@ 10 LPM
Areas Immediately Adjacent to Work Areas	48 hours after final cleanup, all projects (prior to removal of containment barriers)	One	1200	@ 10 LPM

NOTES:

- A. No person involved in asbestos abatement work shall be exposed to greater than 8 hour time weighted asbestos fiber exposure levels or Instantaneous ceiling concentrations of asbestos fibers greater than the limits prescribed in OSHA 29 CFR 1910.1001 and 1926. Where such measures are discovered during testing, appropriate measures as prescribed by OSHA CFR 1910, 1910.1001 and 1926 shall be taken.
- B. Sampling for sealing and containment projects is only required as outlined in Items 4 and 5 above.

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01612 - METHODS OF REMOVAL & TEMPORARY ENCLOSURE

PART I - GENERAL

1.01 WORK AREA PREPARATION:

The work area(s) shall be completely isolated from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area. Should the area beyond the work area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, this contractor shall be responsible for cleaning, on a daily basis, those areas in accordance with all applicable codes. All costs incurred in cleaning, or otherwise decontaminating, non-work areas and the contents thereof shall be borne by the Contractor.

Note: Prior to initiating any preparation work, the Contractor shall verify that the Owner's Air Monitoring Firm has performed any necessary pre-test(s) as required by the New York State Labor Dept.

- A. The following preparations shall be conducted using approved respirators. However, the use of protective clothing during this phase is optional; the decision to use protective clothing should be based upon the degree of contamination found at the work site during visual observation and pre-testing.
 1. Inspection of rooms, shall be made by representatives of the Contractor and Owner before any work is initiated, to inventory and document any existing damage to components, such as furniture, fixtures, walls, doors, and radiator covers. All removable furniture and/or equipment shall be removed from the work area by the Contractor before commencing work. Furniture and equipment shall be pre-abatement cleaned before its removal from the work area. All non-removable furniture and equipment in the work areas shall be completely covered with two layers of polyethylene sheeting, at least 6 mil in thickness, securely taped in place with tape, in addition to critical barrier. All surfaces within the work area are to be precleaned.
 2. Signage: Asbestos caution signs shall be provided and displayed in accordance with Section 1910.1001 (g) of OSHA regulations and Part 56 Title 12 NYCRR. Signs shall be in language of all workers that contractor employs as well as any language known to be used and is reasonably common in the geographical area of the project. Refer to 1.05 of this Specification for additional information.
 3. Before the work is begun, the contractor shall clean with wet cloths, or if necessary with vacuum cleaner equipped with High Efficiency Particulate Absolute (HEPA) filters, all asbestos material. These items and equipment shall be removed from the work area and returned after the job has been completed and the work area has been decontaminated to the satisfaction of the

- owner's agent. Cloths and filters used for cleaning shall be disposed of as contaminated.
4. A "work area" that is contaminated, must be isolated from the balance of the building, and must be decontaminated at the completion of the asbestos-control work.
 5. The Contractor shall isolate the work area by building an approved decontamination facility or installing an approved decontamination trailer at all entrances and exits thereto. Work shall be divided into convenient work areas, each physically adjacent, there shall be a separate decontamination unit for each work area. Decontamination units shall have air lock design as required.
 6. The Contractor shall establish emergency procedures for each area and shall post written plans in areas readily available by employees. These plans shall include plans for medical emergencies, fire evacuation, temporary loss of electrical power and temporary breach of containment.
- B. The following preparations shall be performed in the stated order utilizing protective clothing and respirators. These respirators shall be at least PAPR type respirators approved by NIOSH for use in atmospheres containing asbestos.
1. The work areas shall be completely sealed off by erecting double barriers of fireproof polyethylene sheeting, at least 6 mil in thickness at all entrances and exits to the work area. The sheeting shall be secured to temporary framing with duct tape. The distance between the entrance and exit sheeting shall measure at least 3 feet, and the sheets, when closed, shall overlap the temporary framing so as to seal the opening. The sheets shall be weighted so that they quickly close after being released so that the work area shall always be sealed off by either the entrance or exit sheet. The integrity of all barriers shall be maintained until the project monitor/Owner grants permission for their removal.
 2. Detach and clean removable electrical, heating and ventilating equipment and other items connected to asbestos surfaces. These items shall be removed from the work area using decontamination procedures and returned to their proper place when the work area has been decontaminated.
 3. Wet clean all non-removable items; including built-in equipment, in the work area and cover with two thickness of 6-mil plastic sheeting taped securely in place.
 4. All walls and floors in the work area shall be covered with two layers of fireproof polyethylene sheeting, at least 6 mil in thickness each, taped securely in place to protect such surfaces from water damage, to prevent contamination of those surfaces, and maintained in place with duct tape. Tape all joints including the adjoining with the floor covering.

5. Floor and wall polyethylene plastic shall be overlapped one to the other. The first layer of floor sheeting shall extend up the wall a minimum of 12 inches. The second layer shall be extended up the side walls at least 24". No seams shall be located at the joints between walls and floors. Wall covering shall be securely fastened to the plastic floor covering. Walls and floors to be overlapping layers only; poly shall not be continuous from wall to floor or wall to ceiling. This method of overlap will help to protect floor surfaces from water damage and contamination. Wall cover shall overlap floor by at least 12".

NOTE: Plastic sheeting shall be a minimum of 6-mil fireproof polyethylene film for walls and 6-mil for sealing off corridors. A double thickness of 6-mil polyethylene film shall be used for all floors and critical barriers. All tape shall be high quality duct tape.

6. Temporary walls comprising critical barrier openings greater than 32 square feet in area are to be constructed with solid materials using 3/8" thick plywood sheathing in accordance with Part 56-8 (15). All joints to be airtight; install double layer of polyethylene sheeting as per note above.
7. All ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, convectors, and speakers, etc. shall be individually sealed with polyethylene sheeting at least 6 mil in thickness taped securely in place with duct tape until the entire operation including cleanup is completed. Care must be taken in sealing off lighting fixtures to avoid melting or burning of the sheeting. All appurtenances shall also be pre-abatement cleaned.
8. In order to avoid the potential tripping hazards created by wet plastic on stairs, the floors in stairway areas may remain unprotected by plastic.
9. However, other methods shall be used to protect and/or decontaminate these surfaces. These alternative methods shall be specified in writing and approved by the Owner before the work project begins.
10. Floor drains shall be sealed individually with two layers of 6-mil polyethylene and duct tape then the entire floor shall have a minimum of two thickness of 6-mil polyethylene sheeting.

NOTE: In the event that the adhesive material used to secure the plastic sheeting is found to be of insufficient strength to support the weight of the plastic barriers, then the Contractor shall so inform the A/E and receive direction as to a suitable stronger method of securing the plastic sheeting (e.g., spray-on adhesive, glue beads, horizontal wood battens). All securing procedures shall be of first class workmanship. The Contractor, at his expense, shall restore any and all damaged areas prior to completion of projects which occur as a result of barrier securing. All air handling systems serving the work area must be shut down and locked out.

11. Tools, scaffolding, staging, etc. necessary for the work shall be placed in the area to be isolated prior to erection of the plastic sheeting temporary enclosure.
 12. Prior to commencing work, the contractor shall submit to the Architect/Engineer for approval contingency plans for safe evacuation of the work area in case of fire.
 13. All electrical and mechanical items such as lighting fixtures, diffusers, registers, escutcheon plates, etc which cover the surface to be abated must be removed so as not to interfere with the work.
 14. All abatement area surface penetrations shall be completely sealed off including two layers of polyethylene sheeting, if applicable.
 15. Crawl space and basement corridor walls and ceilings shall be pre-cleaned and covered with two layers of polyethylene sheeting, if applicable.
 16. All sump pump and drainage systems shall be shut off and sealed prior to start up of abatement. If required, the Contractor shall provide a separate filtered pump system to remove wastewater from the abatement area.
 17. Temporary lighting of adequate illumination levels shall be provided by the Contractor for abatement and inspections.
 18. Remove filters from all heating, ventilation and air conditioning systems and pack them in sealable 6-mil minimum single thickness plastic bags, labeled for disposal as asbestos containing material waste. These bags should be handled in the same manner as removed asbestos. The filters should be replaced with new filters as a final step in the decontamination process (after the final washdown).
- C. As all existing ventilating systems in the work area are to be shut down and isolated (and positively pressurized to avoid ductwork contamination) and sealed throughout the removal operation, an alternate system must be utilized. (Existing system shall be critically barriered at all outlets or intakes plus two layers of plastic. If ductwork becomes contaminated as a result of incorrect abatement procedures, then all ductwork and systems shall be either decontaminated or removed and replaced by the Contractor.)
- D. Install approved negative air filtration units utilizing appropriate HEPA filters to exhaust air from the work area. These units shall be sized to achieve a rate of one air change every 15 minutes. The volume (in ft³) of the work area is determined by multiplying the floor area by the ceiling height. The required capacity of the ventilation system (in ft³/min) for the work area is determined by dividing this volume by the minimum air change rate, which shall be one air change every 15 minutes.

Thus: Required capacity of ventilation system in ft³ per min = volume of Work Area (in ft³) /15 min.

1. The number of Negative Air Filtration units needed for the application is determined by dividing the required capacity of the ventilation system as measured in ft³ min by the rated capacity of the Negative Air filtration units to be used.
 2. The power for negative air filtration units must be a temporary source connected through a ground fault circuit outside the work area.
- E. Shut down and lock out electric power to all work areas. All power to work areas shall be brought in from outside the area through a ground-fault interrupter at the source.
- F. All elevators in the work area shall be shut down and isolated.

1.02 CHANGING AREA (CLEAN ROOM)

- A. An isolated changing area shall be provided for the purpose of changing into protective clothing. It shall be constructed using polyethylene sheeting, at least 6 mil in thickness and located so that access to the work area shall be from the changing areas through the shower.
- B. Within the changing area, provide a suitable locker or acceptable substitute for storage of each worker's street clothing.

Note: It is recommended that a toilet facility, sink, and running hot and (at least) cold water be available in the changing area.

1.03 VISUAL BARRIER

- A. Where the work area is immediately adjacent and within view of occupied areas, a visual barrier of opaque polyethylene sheeting at least 6 mil in thickness shall be provided so that the work procedures are not visible to building occupants. Where the area adjacent to the work area is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting. The barrier shall be constructed with wood or metal studs covered with minimum 1/2-inch thick hardboard. Where the solid barrier is provided, sheeting need not be opaque.

1.04 ALTERNATE METHODS OF ENCLOSURE

- A. Alternate methods of containing the work may be submitted by the Contractor to the Architect/Engineer for approval. Do not proceed with any such method(s) without written authorization of the Architect/Engineer.

1.05 SIGNS

- A. Post an approximately 20- by 14-inch manufactured caution sign at each entrance to the work area. The sign shall display the following legend with letter sizes and styles of a visibility at least equal to the following:

LEGEND

NOTATION

Asbestos	1 inch Block
Dust Hazard	3/4 inch Block
Avoid Breathing Dust	1/4 inch Gothic
Wear Assigned Protective Equipment	1/4 inch Gothic
Do Not Remain in Area Unless Your Work Requires It	1/4 Gothic
Breathing Asbestos Dust May Be Hazardous To Your Health	1/4 Point Gothic

Spacing between respective lines shall be at least equal to the height of the respective upper line.

- B. Post an approximately 10- by 14-inch manufactured sign at each entrance to each work area. The sign shall display the following legend with letter sizes and styles of a visibility at least equal to the following:

LEGEND

NOTATION

No Food, Beverages, or Tobacco Permitted	3/4 inch Block
All Persons Shall Don Protective Clothing (Coverings) Before Entering the Work Area	3/4 inch Block
All Persons Shall Shower Immediately After Leaving Work Area And Before Entering The Changing Area	3/4 inch Block

- C. Insure compliance with all requirements noted on the signs by all individuals entering the work area.

1.06 DECONTAMINATION UNIT

- A. For any project requiring either a remote decon unit or for full containment requiring a decon unit, the Contractor shall properly construct such a unit including opaque poly, 36 inch wide airlocks, bag holding rooms large enough to contain securable carts, full clean rooms, proper framing, double poly floors, lockable clean/waste holding rooms, shower areas, equipment rooms, etc. as required by governing codes including Industrial Code Rule 56, Subparts 56-9 and 56-10.

1.07 EMERGENCY PROCEDURES

- A. The Contractor shall post written emergency procedures near or within the clean room in all appropriate languages, read and signed by all workers employed on this project. These procedures should include, but not be limited to:

1. Location and phone numbers of police, fire, and medical emergency response teams.

2. Procedures to facilitate all such responses, e.g. EMT response to cardiac, heat stroke, injury victims within the work area.
3. Procedures in the event of fire in the work area.
4. Procedures in the event of an O₂ deficient atmosphere within the work area.
5. Procedures in the event of a water system failure (leakage) within the work area.
6. Procedures to avoid electrical hazards in the work area.
7. Procedures to avoid slips, trips, and falls in the work area.
8. Procedures to decontaminate injury victims.
9. Procedures to address short-term electrical power failure which affects negative air, lighting, and decontamination activities.
10. Procedures to address long-term electrical power failures.
11. Procedures in the event of a major critical barrier failure.
12. Procedures in the event high airborne fiber concentrations are exhibited during barrier air monitoring.
13. Procedures to address unanticipated discoveries of openings behind surfaces being abated.

1.08 ENCLOSURE INTEGRITY

- A. Upon completion of the construction of all plastic barriers and decontamination system enclosures, and prior to beginning actual abatement activities, twelve (12) hours settling shall be allowed to ensure the integrity of the enclosure.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01613 - ASBESTOS REMOVAL

PART 1 - GENERAL

Not Applicable

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 ASBESTOS

- A. Asbestos-containing materials to be removed shall be thoroughly wetted immediately prior to stripping and/or tooling to reduce fiber dispersal into the air. Wetting agent 50% polyoxyethylene ester and 50% polyoxyethylene ether, Aqua-Gro or equal, in a concentration of one (1) ounce in five (5) gallons of water (or as recommended by other approved manufacturers). The outer covering of any installation which has been painted and/or jacketed shall be perforated in order to allow penetration of the wetting agent, or, where feasible, carefully stripped away while simultaneously spraying the wetting agent on the installation to minimize dispersal of asbestos fiber into the air.
- B. A fine low pressure spray of this solution shall be applied to prevent fiber disturbance preceding removal. Saturate the material sufficiently to prevent emission of airborne fibers in excess of the exposure limits prescribed in the OSHA regulations. The wetted or amended water shall be sprayed on as many times and as often as necessary to ensure that the asbestos material is adequately wetted throughout (especially that asbestos nearest the substrate) to prevent dust emission as specified in the OSHA regulations. No dry removal of asbestos is allowable.
- C. Asbestos-containing material, which is stripped away or otherwise removed, shall be packed while still wet into plastic bags, 6 mil minimum thickness. Bags shall be sealed and placed into drums, covered and sealed for transport. The outside of all drums shall be cleaned before leaving the work area. Periodic cleanup and bagging of removed material while still wet and used coveralls, headcover, etc. shall be done to prevent accumulation of such material on the floor covering where traffic in the area may cause excessive air borne concentrations of the fibers. Stripped materials shall be sprayed as necessary to keep it wet until cleanup.

NOTE: For amosite-containing materials, a small test area shall first be tested with the specified wetting agent to determine material absorption. Inspection of rooms, shall be made by representatives of the Contractor and Owner before any work is initiated, to inventory and document an existing damage to components, such as furniture, fixtures, walls, doors, and radiator covers.

NOTE: Removal procedures may be amended per Applicable Variance AV85.

- D. Removal of the asbestos material shall be done in small sections by two-person teams, on staging platform if needed. The asbestos material shall not be allowed to drop a distance greater than 12 feet. In the event that the drop is greater than 12 feet to the floor a collection platform or chute may be used.
- E. A project supervisor or foreman shall remain on site whenever any type of work, including set up, is in progress. This supervisor's or foreman's name shall be provided to the Owner, Engineer, and Project and Air Monitors, and must be an English-speaking person. This person shall be ultimately responsible for maintaining the site, he shall also ensure that no one exits the work area before going through a proper decontamination process. He shall also ensure that all proper decontamination procedures are followed and that proper waste handling and storage procedures are followed.
- F. Contractor shall provide 24 hour notice to the Project Monitor for pre- and post-abatement inspections. No work may proceed prior to an inspection, and no lock down may proceed prior to an inspection including final air monitoring.
- G. As a method of organizing the asbestos removal work, workers, shall begin on the areas nearest to the decontamination unit and work toward the negative air filtration units. Also, to the extent possible, workers shall always face the negative air filtration units while removing asbestos materials. In this way asbestos fibers released by the process will be drawn away from the workers' breathing zones and towards the filtration units. The Contractor shall have on site an Emergency power source for the negative pressure units to ensure their continuous function in the event of a power failure. The wet material from each section shall be packed and sealed into labeled 6-mil plastic bags prior to starting the next section to prevent the material from drying. Water soaked fallen material shall not be left out of bags overnight, or for more than four hours to prevent loss of its water content due to evaporation. However, plastic bags will not be effective when wire lath and similar sharp-edged materials are involved in asbestos removal. Therefore, contaminated material containing sharp edged items shall be cut to size while adequately wet, placed in small cardboard boxes and double bagged, or singly bagged and then placed in temporary fiber drums. Bags and drums shall be marked with the label prescribed by Section 61.22 (c) of the EPA regulations. The outside of all containers shall be wet-cleaned or HEPA vacuumed before leaving work area. All vacuum cleaners shall be equipped with HEPA filters.

NOTE: 40 CFR 61.22 (j) prescribes a leak-tight container, the integrity of which is the Contractor's responsibility until after deposition at a sanitary landfill which is run in accordance with 40 CFR 61.25. Therefore, caution must be used in the choice of container types, and consideration given to the method of unloading at the landfill. Fragile containers shall be unloaded by hand to prevent rupture and possible airborne emissions.

- H. Negative air shall be maintained to provide four area air changes per hour. Contractor to supply containment volume measurements to the Project Monitor for verification. Air volumes are to be determined by metering the air flows at the machine exhaust outputs and a minimum static pressure differential of .02 inches of water shall be maintained between the inside and outside of the abatement area at all times. A minimum of two negative air machines shall be present in the work area at all times. All negative air machine exhaust ducting shall be monitored continuously by the Contractor to ensure proper system operation. Equipment shall operate continuously, 24 hours a day from beginning of set-up through clearance. At least one negative air unit shall be installed as a back-up to be used during filter changing and other unit failure.
- I. After completion of this removal phase (stripping), all surfaces from which asbestos has been removed shall be wire brushed and/or wet sponged or cleaned by an equivalent method to remove all visible asbestos containing material. During this work, the surfaces being cleaned shall be kept wet using amended water. All disposable equipment shall be packaged for disposal. Container shall be washed with amended water and shall have all exterior particulate matter removed prior to removal from the contaminated area.
- J. All work area barriers including decontamination unit barriers and waste decontamination unit barriers shall be inspected by the supervisor at least twice daily, and shall be documented in the project log book. Repairs shall be made immediately upon discovery and prior to resumption of abatement activities.
- K. All accessory equipment shall be moved to the equipment room in sealed containers (6-mil minimum) and decontaminated for removal.
- L. Watertight and securable waste holding carts shall be available in the bag holding area of the waste out decontamination unit.
- M. All free water (in container areas) shall be retrieved and added to asbestos contaminated waste and then placed in plastic lined drums.
- N. Power tools used to disturb asbestos material shall be equipped with HEPA filtered local exhaust.
- O. Final clean-up of work area may commence.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01614 - AIR MONITORING

PART 1 - GENERAL

1.01 AIR MONITORING

- A. The Contractor shall cooperate fully with all aspects of the air monitoring program which is conducted by an independent air monitoring firm responsible to the District. This Section is provided only as information to the Contractor.
- B. The independent air monitoring firm shall provide a qualified Asbestos Safety Monitor to observe the progress of the work to verify that the contractor's performance meets all state and federal regulations and is in compliance with this specification. The Asbestos Safety Monitor shall have the authority to direct the actions of the Contractor verbally, or in writing, to insure compliance.
- C. In addition, to the independent air monitoring firm hired by the District, the Contractor shall arrange for air monitoring to be conducted in all Work Areas in accordance with 29 CFR 1910.1001, and 1926 or OSHA regulations, on behalf of the Contractor's employees (at least on the first day of major removal work and in the event of major process changes). The Testing Laboratory shall be certified as proficient in asbestos analysis by AIHA or NIOSH and employed by the Contractor. These personal samples shall be obtained from employees engaged in each of the following operations: asbestos removal, (i.e. spraying, scraping, brushing), disposal (i.e. bagging) and clean-up. Representative sampling shall be repeated in the event of major changes in the removal operation. This sampling shall be done with the sampling media and flow rates specified in NIOSH Method 7400. (Samples shall be taken for the determination of the 8-hour time weighted average airborne concentration and of the ceiling concentrations of asbestos fibers.
- D. The results of the Contractor's air monitoring shall be returned within two (2) working days, copies shall be provided to each employee monitored as specified by OSHA Regulations 29 CFR 1910.02 and 1926. The Contractor shall examine these results and evaluate the effectiveness of the controls in use (wet methods, exhaust units and respiratory protection). Copies of these monitoring tests shall be provided to the Owner's Asbestos Safety Monitor, as part of the documentation that the work has been completed. Copies shall also be made available, upon request to representatives of Local, State or Federal Enforcement agencies. Copies of these air monitoring results shall also be posted in a plainly visible location at the job site for the purpose of notifying the Contractor's employees. These shall be posted within one working day upon receipt of the results from the analytical laboratory.
- E. Air monitoring and visual inspection in and adjacent to the Work Area will be conducted on behalf of the Owner throughout the abatement project, and in accordance with this specification.

- F. The testing laboratory shall conduct all required analysis expeditiously and shall report the results of such tests to the Asbestos Safety Monitor. The Asbestos Safety Monitor upon receipt of testing results indicating concentrations above 0.01 fibers/cc have occurred outside the containment barriers or results above 0.02 f/cc within the clean room of the decontamination chamber during the abatement action, shall report these results within one working day to the Contractor, the owner and the A/E, so that prompt corrective action may be taken.
- G. The Asbestos Safety Monitor shall keep a daily log of on site observations concerning contractor's compliance with activities required under these job specifications. The log shall be made available upon request at all times to the owner, the A/E and the appropriate Local, State and Federal agencies. The Asbestos Safety Monitor shall report results in a comprehensive final report, including daily logs, observations and air monitoring results.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01615 - PROJECT DECONTAMINATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Following completion of the asbestos-control work, polyethylene sheeting on walls, then the floor cover, shall be carefully removed, folded to minimize dispersal of asbestos-containing residue and debris, and packed properly in caution-marked double ply plastic bags 3 mil minimum thickness each ply. Bags shall be sealed and placed in fiber or metal drums, covered and sealed for transport. The outside of all drums shall be cleaned before leaving the work area.
 - 1. Vertical sheeting which forms the sole barrier between the work area and occupied area shall remain in place.
 - 2. Double barriers at entrances to the work area shall remain in place.
 - 3. Sheeting over lighting fixtures and clocks, ventilation openings, and occupied area shall remain in place.
- B. Clean all surfaces of the work area including remaining sheeting, tools, scaffolding and/or staging by use of a High Efficiency Particulate Absolute (HEPA) filter vacuum (Note: A HEPA Vacuum will fail if used with wet material). Dry dusting or dry sweeping shall not be permitted. Once vacuuming is complete, all surfaces shall be washed. Cleaning cloths and mopheads shall be rinsed periodically to avoid spreading of asbestos fibers.
- C. Following the first cleaning and prior to the first sheeting removal, apply a thin coat of encapsulating agent on non-removed surfaces only. Then carefully remove sheeting over lighting fixtures and clocks and dispose of as indicated above.
- D. After the area has been allowed to settle for a minimum of twelve (12) hours, perform a second cleaning. Following completion of the second damp-cleaning operation, perform a complete visual inspection of the work area (all surfaces, including beams, ledges, and folds of polyethylene sheeting) to insure that the area is dust free. If any residue is visible after the second cleaning, affected surfaces shall be damp-cleaned again.
- E. Then perform a third cleaning after an additional twelve (12) hour period has elapsed.
- F. Air samples shall be taken in each work area (see Section 02082) for air monitoring and testing.
- G. If the work area is found to be still contaminated, i.e. if these test results exceed any reading for outside air taken pursuant to Section 02082, repeat the damp-cleaning, air monitoring, and testing.

- H. After the work area is found to be decontaminated, and upon approval of the Project Monitor, remaining polyethylene sheeting shall be carefully removed, folded, and disposed of as indicated above.

1.02 DECONTAMINATION

- A. The Contractor shall provide an adequate decontamination unit consisting of a serial arrangement of rooms or spaces adjoining the Work Area as indicated on plans or a decontamination trailer meeting the criteria outlined below. Each space shall be clearly identified and separated from the others by plastic sheet doors, acceptable air locks minimum 3' wide designed to minimize fiber and air transfer as people pass between areas. Air locks shall have at least three layers of 6-mil plastic sheetings.
- B. The decontamination areas are described below:
 - 1. Clean Room: In this room, persons remove and leave all street clothes and put on clean, disposable coveralls. Approved respiratory protection equipment is also picked up in this area. Sheeting for this area to be 6-mil opaque for walls and double layer floor. NO ASBESTOS CONTAMINATED ITEMS ARE PERMITTED IN THIS ROOM.
 - 2. Shower Room: This is a separate room used for transit by cleanly dressed people entering the job site from the Clean Room and for showering by them after they have undressed in the Equipment Room. Hot and cold water adjustable at the tap is required. THIS IS A CONTAMINATED AREA.
 - 3. Equipment Room: Work equipment, footwear and all other contaminated work clothing shall be stored here. This is also a change and transit room for people. All areas between the Shower Room and Work Area shall be considered part of the Equipment Room. Double layer plastic floor and wall covering is required. A walk off water pan for cleaning footwear is required. THIS IS A CONTAMINATED AREA.

1.03 SAFETY

Workers and visitors shall observe the following Work Area entry and exit procedures:

- A. WORKER ENTERS CLEAN ROOM AND REMOVES STREET CLOTHING, PUTS ON CLEAN OVERALLS AND RESPIRATOR, AND PASSES THROUGH SHOWER ROOM INTO THE EQUIPMENT ROOM.
- B. ANY ADDITIONAL REQUIRED CLOTHING AND EQUIPMENT PREVIOUSLY DEPOSITED IN THE EQUIPMENT ROOM IS PUT ON (WHEN WORK AREA IS TOO COLD FOR COVERALLS ONLY, THE WORKER WILL USUALLY PROVIDE HIMSELF/HERSELF WITH ADDITIONAL WARM GARMENTS TO BE WORN UNDER THE DISPOSABLE CLOTHING. THESE MUST BE TREATED AS CONTAMINATED CLOTHING AND LEFT IN THE DECONTAMINATION UNIT). UNDER NO CIRCUMSTANCES SHALL A WORKER ENTER THE WORK AREA WITHOUT HAVING PROTECTIVE CLOTHING ON.

- C. WORKERS PROCEED TO WORK AREA AND PERFORM WHATEVER WORK IS TO BE DONE.
- D. BEFORE LEAVING THE WORK AREA, THE WORKER SHALL REMOVE ALL GROSS CONTAMINATION AND DEBRIS FROM THE COVERALLS USING A VACUUM WITH A HIGH EFFICIENCY PARTICULATE ABSOLUTE (HEPA) FILTER. IN PRACTICE, THIS IS USUALLY CARRIED OUT BY ONE WORKER ASSISTING ANOTHER.
- E. THE WORKER PROCEEDS TO EQUIPMENT ROOM AND REMOVES ALL CLOTHING EXCEPT APPROVED RESPIRATORS. EXTRA WORK CLOTHING MAY BE STORED IN CONTAMINATED END OF THE UNIT. DISPOSABLE COVERALLS ARE PLACED IN A BAG FOR DISPOSAL WITH OTHER MATERIAL.
- F. THE WORKER THEN PROCEEDS DIRECTLY INTO THE SHOWER ROOM. RESPIRATORS SHALL BE TAKEN OFF LAST TO PREVENT INHALATION OF FIBERS DURING REMOVAL OF CONTAMINATED CLOTHING AND SHALL NOT BE REMOVED UNTIL THEY HAVE BEEN WASHED FREE OF DUST.
- G. AFTER SHOWERING, THE WORKER MOVES TO THE CLEAN ROOM AND DRESSES IN STREET CLOTHING PRIOR TO EXITING.
- H. RESPIRATORS ARE PICKED UP, WASHED THOROUGHLY AND DISINFECTED AS REQUIRED BY OSHA REGULATIONS 29 CFR 1910.134, AND 1926, AND WRAPPED AND STORED IN THE CLEAN ROOM.
- I. All filters in the air handling system(s) shall be carefully removed, treating as contaminated material, bagged, and disposed of as indicated above.
- J. Filters in dual cartridge type respirators used during the preparation phase of the job shall be removed, wetted and discarded as contaminated waste. A new filter shall be in place in the respirator prior to re-use. For powered air purifying respirators or supplied air respirators, the manufacturer shall be consulted about the proper decontamination sequence.
- K. There shall be no smoking, eating or drinking in any contaminated areas (shower room, equipment room and work area). Respirators shall be worn in all contaminated areas. Failure to observe these requirements will result in the ejection of the offender from the premises. Failure of the offender to leave will result in a written stop work order.
- L. Work footwear, i.e., non-disposable, shall remain inside the contaminated area until completion of the job and shall be thoroughly cleaned at that time.
- M. It shall be the contractor's responsibility to ensure all employees follow the appropriate procedures, including the decontamination procedures listed. Employees who repeatedly violate proper procedures shall be subject to disciplinary measures by the contractor, including dismissal if necessary.
- N. Three final cleanings will be performed prior to clearance air monitoring and lock down. Each cleaning shall be at a minimum of twelve hours apart to allow for drying time.

- O. Post abatement visual inspections shall be conducted by the Project Monitor prior to all cleanings and lockdown. All surfaces in the work area shall be encapsulated, not just abated surfaces. However, any cosmetic surfaces such as painted or finished surfaces shall have three layers of polyethylene applied and a fourth cleaning shall be done on the cosmetic surface to eliminate defacing of the surface due to lockdown.
- P. After completion of the cleaning operation the contractor shall:
1. Notify the Asbestos Safety Monitor that a POST removal clean-up inspection can be performed to ensure all visible asbestos has been removed and the area is dust free. The owner's testing firms will conduct an aggressive visual inspection of all work areas. In addition to a visual inspection conducted at the floor level, the owner's testing firm shall inspect all exposed surfaces in the work areas, including those at the ceiling level (using ladder as necessary), to ensure that no visible asbestos-containing materials have been left above ceilings, structural members or on light fixtures or other surfaces. The contractor must provide the ladders or scaffolding necessary to inspect these areas and sufficient electrical sources, location and number to conduct air sampling.
 2. Request air monitoring of the work area by the Owner's testing firm within 48 hours. This testing shall be done using NIOSH Method 7400 by a credentialed laboratory. The Owner's testing firm will then conduct overall area monitoring under simulated conditions of normal building occupancy. Fans with a radius of one foot and capable of creating a minimum air velocity of 500 ft per minute shall be used in each room to be monitored to stir up any residual invisible fibers such as would be entrained in air by the pedestrian traffic under conditions of normal occupancy. Asbestos fiber concentrations shall not exceed 0.01 f/cc. Final air monitoring clearance testing will not be taken if any of the surfaces in the work area are wet.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01616 - CLEAN-UP PROCEDURES

PART 1 - GENERAL

1.01 CLEAN-UP

The following clean-up procedures shall be required for all large and small abatement projects:

- A. Frequency for containerizing: Cleanup of accumulations of loose asbestos material shall be performed whenever enough loose asbestos material has been removed to fill a single leak tight container of the type commensurate with the material properties. In no case shall cleanup be performed less than once prior to the close of each working day. Asbestos material shall be kept wet until cleaned up.
- B. Frequency of dust: Accumulations of dust shall be cleaned off all surfaces on a daily basis using HEPA VACUUM and/or wet cleaning methods.
- C. Frequency for enclosures: Decontamination enclosures shall be HEPA vacuumed and/or wet cleaned at the end of each shift.
- D. Clean-up tools and equipment: Accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dustpans, squeegees or shovels. Metal shovels shall not be used to pick up or move waste.

1.02 POST ABATEMENT REQUIREMENTS

- A. The following clean-up procedure shall be required after completion of all abatement activities:
 - 1. Clean-up tools and equipment: All accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pans, squeegees or shovels. Metal shovels shall not be used to pick up or move waste. HEPA vacuums shall be used to clean all surfaces after gross cleanup.
 - 2. First Cleaning: All surfaces in the work area shall be first wet cleaned using rags, mops and sponges. To pick up excess liquid and wet debris, a wet purpose shop vacuum may be used and shall be decontaminated prior to removal from the work area.
 - 3. First Sheetting Removal: The cleaned, exposed barrier layer of plastic sheeting shall be removed from walls and floors. Windows, doors, HVAC system vents and all other openings shall remain sealed. Decontamination enclosure systems shall remain in place and be utilized.

4. Second Cleaning and Sheeting Removal: After the first cleaning, at least twelve hours shall be allowed for asbestos to settle. Thereafter all objects and surfaces in the work area shall be HEPA vacuumed and/or wet cleaned. The remaining plastic on walls and floors only shall then be removed. All windows, doors, HVAC system vents and all other openings shall remain sealed.
5. Third Cleaning: After the second cleaning, at least twelve hours shall elapse before HEPA vacuuming and/or cleaning all surfaces in the work area. The negative pressure ventilation units shall remain in continuous operation during the settling periods and third cleaning.
6. Removal of Waste: All containerized waste shall be removed from the work area and the holding area.
7. Removal of Tools and Equipment: All tools and equipment shall be removed from the work area and decontaminated.
8. Clearance Air Monitoring: Clearance air monitoring is to be conducted by Owner's Laboratory.
9. Removal of Isolation Barriers: The isolation barriers shall be removed only after satisfactory clearance air monitoring results have been achieved.

1.03 FINAL CLEAN-UP

- A. All critical barriers shall be unsealed.
- B. Plastic sheeting, tape and any other debris shall be disposed of in sealed plastic bags labeled as asbestos contaminated waste.
- C. The inside of windows shall be washed.
- D. Any walls, floors, trim, doors, furniture or other items damaged during the work shall be repaired and refinished to match existing material.
- E. Woodwork, trim, floor, furniture, plumbing and electric light fixtures shall be cleaned.
- F. Cloths or sponges used in the cleaning operation shall be disposed of as contaminated waste.
- G. There shall be no residue left on floors, ceilings, electric light fixtures or other surfaces.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01617 - MONITORING & SUPERVISION

PART 1 - GENERAL

1.01 DESCRIPTION

The specifications of this section are provided **as information only** to the Asbestos Removal Contractor.

- A. All work herein described shall be performed as one single contract responsible to the Owner and shall include the services of both an Asbestos Safety Control Monitor and Asbestos Safety Technician. This work shall be in addition to, and independent of the OSHA mandated air monitoring conducted on behalf of the contractor's employees. Testing Laboratory shall be from the approved list of firms published by the New York State Health Department.

1.02 GENERAL DUTIES

- A. The Asbestos Safety Technician shall perform all air sampling specified herein, and shall be thoroughly familiar with the Asbestos Removal Specifications. Acting on behalf of the Owner, he shall have access to all areas of the Asbestos Removal project at all times and shall randomly inspect and monitor the performance of the Contractor to verify that said performance meets all Federal and State Regulations and is in compliance with the Asbestos Removal Specifications. The Asbestos Safety Technician may be on site throughout the entire abatement operation.

1.03. AUTHORITY AND COMPLIANCE RESPONSIBILITIES

- A. The Asbestos Safety Technician shall have the authority to direct the actions of the Contractor verbally, and in writing to assure compliance. In the event of continual non-compliance or serious violation, the Asbestos Safety Technician shall notify the Owner, the Architect/Engineer and, as necessary, appropriate governmental agencies. The Asbestos Safety Technician shall issue a written "Stop Work" order to the contractor if so directed by the Owner, the Owner's Architect/Engineer or an appropriate governmental agency. All directions to the contractor shall be legible, dated, and shall bear the signature of the Asbestos Safety Technician. Copies shall be forwarded to the Owner and Architect/Engineer.

1.04 REPORTING OF AIR SAMPLING AND ANALYSIS DATA

- A. The Testing Laboratory shall conduct all required analysis within the time frame specified and in conformance with specified analytical procedures and shall report the results of such tests to the Asbestos Safety Technician. The Asbestos Safety Technician, upon receipt of testing results indicating that concentrations above 0.01 fiber/cc have occurred outside the containment barriers or within the clean room of the decontamination chamber during the abatement action shall report these results within one working day verbally or by telephone communication if necessary to the Contractor, the Owner and the A/E, so that prompt corrective action may be taken.

This telephonic or verbal communication shall be followed by a written report. A copy of which shall be sent to the administrative authority having jurisdiction.

- B. The Asbestos Safety Technician shall keep a daily log of on-site observations concerning Contractor's compliance with activities required under the job specifications, listing all deficiencies encountered and the names of all persons entering the work area. This log shall be made available upon request at all times to the Owner, the Architect/Engineer and to appropriate Local, State and Federal Agencies. The Asbestos Safety Technician shall report results in a comprehensive final report, including daily logs, required inspection reports, observations and air monitoring results. The Asbestos Control Monitor shall maintain the report as a permanent record and present a copy to the Owner within twenty (20) working days.

1.05 PRE-TESTING

- A. Prior to the initial preparation for asbestos removal (i.e., before construction of barriers, masking and sealing, test(s) shall be conducted under normal building occupancy conditions in order to establish base line air quality data for future reference. If pre-test(s) have not already been performed, the Asbestos Safety Technician shall conduct the pre-test(s).
 - 1. Conditions during sampling: Whenever possible, sampling shall be conducted during conditions of normal use occupancy. If an observer cannot be present to ensure the integrity of each sample while building is occupied, then the Air Testing Technician shall return when the building is not occupied to perform monitoring under conditions of simulated normal use occupancy. The aspect of normal use activity that is important to recreate during simulation is the re-entrainment in air fibers which, may have settled out onto horizontal surfaces. To this end, when the building is not occupied, the Asbestos Safety Inspector shall supply and place propeller type fans in the space. The fan shall have blades with a radius of at least one foot and shall be capable of creating a minimum air velocity of 500 ft per minute. These may be of the oscillating type. The sampling pump and sampling media shall be placed 20-40 ft at a right angle from the line(s) of airflow created in front of the fan.
 - 2. Sampling Procedure: Filter cassettes and sampling train shall be assembled as specified in NIOSH Method #7400. The flow rate shall be between 2.0 and 10 liters per minute. The total volume shall be of sufficient quantity to guaranty 0.005 fibers/cc level of reliable quantitation. Pumps shall be calibrated before and after sampling and a record kept of each calibration. At least five samples per homogenous sampling area shall be collected with on additional for every 5,000 sq.ft. greater than 25,000 sq.ft.
 - 3. Analysis: NIOSH Method #7400.
 - 4. Maximum turn-around time: 2 working days.
 - 5. Evaluation Criterion: 0.01 f/cc.

6. The Asbestos Safety Technician shall perform all air sampling specified in this sub-chapter, and shall be thoroughly familiar with applicable regulations. He shall have access to all areas of the asbestos removal project at all times and shall inspect and monitor the performance of the Contractor to verify that said performance complies with these specifications.
7. The Asbestos Safety Technician shall have the authority to direct the actions of the contractor verbally and in writing to assure compliance. In the event of continual non-compliance or serious violation the Asbestos Safety Technician shall notify the Inspector from the Administrative Laboratory having jurisdiction who shall issue a written Stop Work Order to the Contractor and have the work site secured until all violations are resolved.
8. The Asbestos Safety Technician upon receipt of testing results indicating that concentrations above 0.01 fibers/cc have occurred outside the containment barriers or above .02 f/cc within the clean room of the decontamination chamber during the abatement action shall report these results within one working day verbally or by telephone communication if necessary to the Contractor, the owner and the architect/engineer so that prompt corrective action may be taken. This telephone or verbal communication shall be followed by a written report.

1.06 REMOVAL

- A. Monitoring outside the work area shall be provided throughout removal to ensure that no outside contamination is occurring.
- B. Filter cassettes and sampling train shall be assembled as specified in NIOSH #7400. The flow rate shall be between 2.0 and 10 liters per minute. The total volume shall be sufficient to achieve a detection limit of 0.01 f/cc. Pumps shall be calibrated before and after sampling and a record kept of this calibration.
- C. Three samples per day shall be provided. One stationary sample at decontamination unit entrance/exit and two samples adjacent to work area, but remote from the decontamination unit entrance. In the selection of adjacent areas to be monitored, preference shall be given to rooms which may remain occupied by unprotected personnel.
- D. If the Contractor's barriers or other control methods are observed to malfunction and if the Contractor does not correct the problems immediately upon notifications, then the work stoppage procedures shall be followed. In such a situation, additional sampling up to three samples per day, shall be performed by the Asbestos Safety Technician.
- E. Analysis: NIOSH Method #7400.
- F. Maximum turn-around time: two working days.
- G. The evaluation criteria: 0.01 f/cc.

- H. Series of smoke tests shall be performed at the decontamination unit entrance/exit, by the Asbestos Safety Technician to ensure continuous negative air pressure. This test shall be performed before each work shift and every four hours thereafter until work stops.

1.07 POST REMOVAL TEST

- A. The Asbestos Safety Technician shall provide monitoring of work area (s) within 48 hours of final cleaning and before removal of critical barriers. This test is required to establish safe conditions for removal of critical barriers and to permit reconstruction activity to begin. Sufficient time following clean-up activities shall be allowed so that all surfaces are dry during monitoring.
 - 1. Conditions During Sampling: Normal occupancy use conditions shall be simulated using fans. The Asbestos Safety Technician shall supply and place propeller-type fans in each room to be sampled so as to cause settled fibers to rise and enter the air. The fans shall have blades with a radius of at least 20" and shall be capable of creating a minimum air velocity of 500 ft. per minute. The sampling pump and sampling media shall be placed 20-40 ft. at a right angle from the line(s) of air flow created in front of the fan. Negative air equipment must operate so as not to exceed 2 air changes per minute.
 - 2. Sampling Procedure: Filter cassettes and sampling train shall be assembled as specified in NIOSH #7400. The flow rate shall be between 2.0 and 10 liters per minute. The total volume shall be of sufficient quantity to guaranty 0.005 fibers/cc level of reliable quantitation. Pumps shall be calibrated before and after sampling and a record kept of this calibration.
 - 3. Sampling Frequency and Location: Take a minimum of five samples per homogenous abatement area plus one for each 5,000 sq. ft. greater than 25,000 sq.ft.
 - 4. Analysis: NIOSH Method #7400.
 - 5. Time for Laboratory Analysis: Maximum turn-around time upon completion of sample is thirty six (36) hours.
 - 6. Evaluation Criteria: If any test results exceed 0.01 fiber/cc the Asbestos Safety Technician shall so inform the Contractor, the Owner and the Architect/Engineer.
 - 7. Final Clearance: Air Testing shall be in accordance with A.H.E.R.A. interim methodology as prescribed in EPA Regulation 40 CFR Part 763 (Transmission electron Microscopy).
- B. The Contractor shall be required to re-clean all surfaces using wet cleaning methods and provide negative HEPA filtered exhaust air during the re-cleaning process. This process of re-cleaning, allowing surfaces to dry, and re-testing shall be repeated until compliance is achieved.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01620 - REMOVAL AND DISPOSAL OF PBC CONTAINING MATERIALS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section describes the procedures and requirements to be followed by the Contractor for removal and disposal of building sealants (including caulking and glazings) which contain polychlorinated biphenyls (PCB's), and procedures for PBC extraction and encapsulation of building surfaces that were in contact with the sealants at levels of 50ppm or more. PCB containing sealants require special handling during removal to prevent worker and building occupant exposures.
- B. The worker training and disposal procedures are determined by the PCB concentration in the sealants. Sealants that contain 50 parts per million (ppm) or more are classified as regulated hazardous waste and require worker training, managing and disposal as such (Refer to Part 3.01, B - for details). Sealants that contain levels less than 50 parts per million (ppm) but more than 1 ppm are classified as non-hazardous, regulated solid waste in New York and require worker training, managing and disposal as such (see Part 3.01, A for details).

1.02 WORKER TRAINING

- A. All persons performing removal or handling of PCB containing materials shall be trained at a minimum on the health hazards of PCB's, symptoms of exposure, medical surveillance, work methods and engineering controls to prevent work place exposure and release into the environment, use of personal protective equipment, waste handling, disposal requirements, and hazardous communications.
- B. All persons performing removal or handling of PCB containing materials with concentration less than 50 ppm, but more than 1 ppm shall be performed by persons trained and in accordance with O.S.H.A. 8 - hour awareness training including, at a minimum, the topics listed in Section 1.02, A.
- C. All persons performing removal or handling of PCB containing materials with concentrations of 50 parts per million (PPM) or greater shall be performed by persons trained and in accordance with O.S.H.A. Hazardous Waste Operations, as determined by O.S.H.A. 1910.120.

1.03 O.S.H.A. EXPOSURE MONITORING

- A. During removal or handling of PCB containing materials, worker airborne exposure shall be monitored by the contractor. This monitoring shall be done in accordance with Occupational Safety and Health Administration personal/occupational exposure monitoring requirements. Results of monitoring shall be submitted to the Engineer.

1.04 PERSONAL PROTECTIVE EQUIPMENT (P.P.E.)

- A. During removal or handling of PCB containing materials, and products used in the process, workers shall wear suitable skin, hand, eye and respiratory protection. At a minimum, gloves and skin protection from chemical resistance, and P100 rating half face respiratory protection shall be worn. P.P.E. shall be modified as necessary based on exposure monitoring and hazards present. The specifics of the required P.P.E. shall be defined by the Contractor's O.S.H.A. health and safety program. Any P.P.E. proposed that does not meet the minimum requirements specified must be approved in writing by the Engineer.

1.05 REGULATORY REQUIREMENTS

- A. In addition to the requirements outlined in this specification, the Contractor shall comply with the U.S. Environmental Protection Agency 40 CFR part 761, New York State Department of Environmental Conservation 6NYCRR 370-376, Toxic Substance Control Act (TSCA) and Federal Occupational Safety and Health Administration (O.S.H.A.) 29CFR 1926 & 1910 and all other relevant federal, state and local regulations.

PART 2 - PRODUCTS

2.01 WORK AREA PREPARATION, SEALANT REMOVAL, SURFACE TREATMENT, CLEANUP AND ENCAPSULATION FOR WORK AREAS WHERE PCB SEALANT CONCENTRATIONS ARE GREATER THAN OR EQUAL TO 50 PPM

- A. Work Area Preparation - Precautions shall be taken to contain the sealants during removal and prevent the sealant from being released into the environment. A drop cloth shall be placed below the work area and shall extend five feet out (minimum) from the work area and additional 5 feet in every direction for every story above the 1st floor, or as determined necessary. Any caulking/sealant identified in the soil adjacent to the building will be the Contractor's responsibility to remove from the soil and dispose of properly. The interior of the windows shall be covered and sealed with one layer of six millimeter, fire-retardant plastic to prevent migration of dust into the building.

- B. Sealant Removal - Precautions shall be taken to contain the caulking during removal. The sealant shall be scraped using manual methods. No visible emissions will be allowed. Dust must be kept to a minimum and wetting or misting of the sealants may be required to control dust. No electric grinders or brushes shall be utilized. Any proposed electric equipment to be used in the removal must be approved by the Engineer and at a minimum be equipped with dust shroud, and vacuum containing a HEPA filter. The Contractor will propose to the Engineer the methods to be used to contain all dust. If methods produce visible dust then an isolation enclosure ("tent") shall be required. Any contamination resulting from the removal process shall be the contractor's responsibility to remediate the impacted areas to EPA standards for high occupancy use areas. All sealant shall be removed from the substrate completely. Any metal or other materials (i.e. window frames) that are to be disposed of and were in direct contact with the sealant must be cleaned free of PCBs sealants and residuals.
- C. Building Surface Treatment - PCB Extraction - This applies to all areas where PCBs are being removed with concentrations over 50 ppm: After removal of all sealants from surfaces are complete, the Contractor shall vacuum all surfaces within five-feet of work area using a HEPA vacuum starting from the highest point down, to ground level. The work area where PCB concentrations were over 50 ppm must then be treated with CAPSUR® PCB Extraction System, manufactured by Integrated Chemicals, Inc. (ph. 651-426-3224), or equal. The CAPSUR shall be applied to the areas in of the building that are remaining and that were in direct contact with the PCB sealants. The application method shall be per manufactures recommendations (i.e. applying in liquid form using a chemical sprayer or foam form using foam applicator). After allowable extraction time, the CAPSUR shall then be removed from the surfaces using a wet vacuum that is equipped with a HEPA filtration. The surfaces must then be rinsed with clean water by applying water and removed it using wet vacuum that is equipped with a HEPA filtration. The rinse process shall be repeated three times. The Contractor must provide a written procedure for application, removal and rinsing procedures to the Engineer for approval prior to start of work.
- D. Work Area Cleanup - After the PCB extraction is complete in the areas of sealant containing 50 ppm or greater, the plastic on the exterior shall be cleaned free of any residual debris and wiped clean prior to removal. Inside the building, the plastic barrier shall be removed and the surfaces within the work area shall be HEPA vacuumed and wiped from highest point down to the ground using disposable wipes (Sentinel 805 Envirowash distributed by SECI 800-543-4592 or equal). Note: the interior plastic may need

to be left in place to protect the interior of the building when the new window blocking and/or receivers are installed, non-asbestos project only. This is to be coordinated with window contractor, see Section 2.03. All work areas shall be cleared based on visual inspection by the Contractor and a representative of the Owner. Inspection results shall be included in the Contractors daily log. Inspection shall pass when no visible residue of sealant or residual dust is present.

E. Surface Treatment-Encapsulation - Upon completion of the cleanup procedure and visual inspection, the surfaces that were in direct contact with sealants containing PCBs at levels greater than 50 ppm shall be encapsulated by a two layer, two color barrier system as follows:

1. The barrier shall consist of Sikagard 62® High-build, protective, solvent-free colored epoxy coating (10-mils thick), or equal.
2. The areas to be encapsulated shall be the areas in direct contact with the sealants and extending out to the edge of rough openings. The details and extent of application shall be coordinated with the Architect.
3. The two layer coating system is for the purpose to identify wear on the outer layer.
4. The colors of the coating shall be submitted to the Architect for approval prior to application.
5. The product shall be applied in accordance with the manufacturer's recommendations and architects approval.

F. Asbestos and PCB containing Sealants - Where sealants contain both PCBs and asbestos abatement procedures for work area prep, removal and clean up. The Contractor will also follow Part 2.01, Section A, B, C, D and E of this specification.

2.02 WORK AREA PREPARATION, SEALANT REMOVAL AND CLEANUP FOR WORK AREAS WHERE PCB SEALANT CONCENTRATIONS ARE LESS THAN 50 PPM

A. Work Area Preparation - Precautions shall be taken to contain the sealants during removal and prevent the sealant from being released into the environment. A drop cloth shall be placed below the work area and shall extend five feet out (minimum) from the work area and additional 5 feet in every direction for every story above the 1st floor, or as determined necessary. Any caulking/sealant identified in the soil adjacent to the building will be the Contractor's responsibility to remove from the soil

and dispose of properly. The interior of the windows shall be covered and sealed with one layer of six millimeter, fire-retardant plastic to prevent migration of dust into the building.

- B. Removal - Precautions shall be taken to contain the caulking during removal. The sealant shall be scraped using manual methods. No visible emissions will be allowed. Dust must be kept to a minimum and wetting or misting of the sealants may be required to control dust. No electric grinders or brushes shall be utilized. Any proposed electric equipment to be used in the removal must be approved by the Engineer and at a minimum be equipped with dust shroud, and vacuum containing a HEPA filter. The Contractor will propose to the Engineer the methods to be used to contain all dust. All sealant shall be removed from the substrate completely. Any metal or other materials that were in direct contact with the sealant must be cleaned free of PCBs sealants and residuals.
- C. Work Area Cleanup - After removals are complete, the Contractor shall vacuum all surfaces within five-feet of work area using a HEPA vacuum starting from the highest point down, to ground level. The work area must then be wiped from highest point down to the ground using disposable wipes (Sentinel 805 Envirowash distributed by SECI 800-543-4592 or equal). Inside the building, the plastic barrier shall be removed and the surfaces within the work area shall be HEPA vacuumed and wiped from highest point down to the floor level. Note: the interior plastic may need to be left in place to protect interior of the building when the new window blocking and/or receivers are installed, non-asbestos project only. This is to be coordinated with window contractor, see Section 2.03. All work areas shall be cleared based on a visual inspection by the Contractor and a representative of the Owner. Inspection results shall be included in the Contractors daily log. Inspection shall pass when no visible residue of sealant or residual dust is present.
- D. Asbestos and PCB containing Sealants - Where sealants contain both PCBs and asbestos, follow the asbestos abatement procedures for work area prep, removal and clean up. The Contractor will also follow Part 2.02, Sections A, B, & C of this specification.

2.03 DISTURBANCE OF ENCAPSULATED BUILDING SURFACES

- A. If encapsulated surfaces are disturbed (i.e., drilling or cutting) the following training and procedures shall apply:
 - 1. Any worker shall be trained in accordance with O.S.H.A. requirements in Section 1.02 of this specification.

2. Dust barriers shall be provided to protect the interior of the building from dust (i.e. the interior dust barrier for the sealant removal project may be left in place until new window blocking and of receivers are installed, non-asbestos project only).
3. Work methods used shall control dust, (i.e. wet drilling and cutting).
4. All power tools used shall be equipped with a dust shroud and HEPA vacuum.
5. All dust cleanup and inspections shall be in accordance with Section 2.02, C.
6. The Contractor must provide and ensure that workers use washing facilities.

2.04 HYGIENE FACILITIES

- A. The Contractor must provide and ensure that workers use washing facilities.
- B. Washing facilities shall be provided for employees. Such facilities shall be in near proximity to the work site and provided with water, soap and clean towels to enable employees to remove contamination from their skin.
- C. Washing facilities must include change areas equipped with storage street clothes and separate areas with facilities for removal and storage of contaminated protective work clothing and equipment. Change areas are to be used for taking off street clothes, suiting up in clean working clothes (protective clothing), donning respirators prior to beginning work, and dressing in street clothes after work. No contaminated items should enter this clean area.
- D. Work clothing must not be worn away from the job site. Under no circumstances should contaminated work clothes be laundered at home or taken from the work site, except to be laundered professionally or properly disposed of following applicable regulations.
- E. Showers shall be provided when there is potential for extensive contamination of employee's skin, hair and protective clothing. Shower facilities must be provided if feasible so that exposed employees can wash lead from their skin and hair prior to leaving the work site. Where showers are provided, employees must change

out of their work clothes and shower before changing into their street clothes and leaving site.

PART 3 - DISPOSAL

3.01 DISPOSAL

- A. PCBs levels less than <50 ppm - All PCB containing caulking and sealants shall be removed, containerized and disposed of as a non-hazardous PCB regulated waste. All waste shall be placed in appropriate containers and labeled as "PCB Containing Waste." All waste shall be manifested with a Non-Hazardous, Regulated Waste Manifest and disposed of at a landfill permitted to accept PCB containing wastes.
- B. PCB levels 50 ppm or greater - All PCB containing caulking and sealants shall be removed, containerized and disposed of as a RCRA Regulated Hazardous PCB containing waste. All waste shall be placed in Department of Transportation (DOT) approved waste containers and labeled "Hazardous Waste - TOXIC PCB Containing." In addition, the following information shall be placed on the container: Date container was filled; Generator/Owner name and address; DOT Shipping Name (i.e. Hazardous Waste Solid N.O.S.); EPA ID number of generator if applicable and manifest number container is listed on. Storage of this waste must be in a secured area and labeled "Hazardous Waste Storage."
- C. PCB and Asbestos Containing - When the sealants are PCB and asbestos containing, the waste must be managed for both waste streams, including labeling, manifesting, transportation and disposal.
- D. Building Debris with PCB sealants removed - When all visible PCB containing sealants have been removed from non-porous (i.e. metal window frames and sashes) the building materials shall be disposed of a Regulated PCB containing solid waste. The disposal facility shall be notified in writing of the contents of the waste stream and provide a written approval for acceptance of the waste. Notices shall be provided to the Engineer prior to disposal.

PART 4 - SUBMITTALS

4.01 SUBMITTALS

- A. Prior to Commencement of Work:
 - 1. The Contractor shall submit a list of the personal who will be employed by him and his sub-contractors in the removal

work. Present evidence that workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1910.134.

2. Project Supervisor: Submit the resume of the proposed Project Supervisor.
3. Submit copy of Health and Safety program.
4. Submit Material Safety Data Sheets (MSDS) for all chemical and products to be used.
5. Submit copies of waste hauler and disposal facility permits.
6. Submit copy of non-hazardous regulated waste manifest to be used.
7. Submit information on waste containers to be used for hazardous and non-hazardous wastes.
8. Submit copies of labels to be used on both non-hazardous and hazardous waste containers.
9. Submit written plan for application, remove and cleanup procedures for CAPSUR PCB Extraction process.
10. Submit color choices and application procedures for Sikagard 62® High-build, protective, solvent-free colored epoxy coating (10-mils thick) encapsulant.

B. During abatement activities, Contractor shall:

1. Submit copies of all waste manifests for all waste materials removed from the site.
2. The Contractor will maintain worksite log books with information on the work being completed, number of workers, dates, amounts, quantities, sub-contractors, inspections and results and waste shipments.
3. Submit results of bulk material analysis, waste sample classification and OSHA compliance air monitoring results.

C. Project Closeout Submissions:

1. Submit copies of all waste disposal manifests.

2. Submit OSHA compliance air monitoring records conducted during the work.
3. Submit copies waste classification testing.
4. Submit copies of contractors daily logs.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01700 - CONTRACT CLOSEOUT

CONTENTS

1. Scope
2. Punch List and Final Inspection
3. Operations and Maintenance Instructions
4. Project Closeout Documents
5. Emergency Repairs
6. Certificate of Substantial Completion
7. Contractor's Guarantee

1. SCOPE

Prior to the release of final accrued retainage monies, the Contractor shall comply with the procedures for closing out the Construction Contract and to effect the project's transition to the Owner as summarized herein below.

2. PUNCH LIST AND FINAL INSPECTION

a. Preparation of Punch List:

1. When the Contractor determines that the project is substantially complete, he shall prepare a "Punch List" of the last items to be completed or corrected and shall notify the Owner in writing through the Architect that the project will be ready for a final inspection on a definite date which shall be stated in such notice. Such notification shall be given at least ten (10) days prior to the date stated for final inspection.
2. It shall be noted here, and emphasized, that preparation of the "Punch List" is a responsibility of the Contractor and not the Architect. The Architect's sole role will be that of an observer to assure that the design intent is carried out, and as an administrator of the Construction Contract.
3. The Contractor's failure to include an item of deficiency on the punch list issued to the Contractor shall not relieve the Contractor of its responsibility to perform its work in accordance with the Drawings and/or Specifications, and as such, the punchlist may be revised, updated, and/or reissued at any time.

b. Review and Substantial Completion:

The Architect will review the Contractor's "Punch List" and on the basis of his inspection will verify the condition of substantial completion and prepare the Certificate of Substantial Completion, A.I.A. Document G704.

c. Completion and Final Inspection:

1. Written notice shall also be given to the Architect by the Contractor upon completion of any work which, on the above stated final inspection, was determined to be incomplete, incorrect, or unsatisfactory and not to the stage of substantial completion. On receipt of such notice, additional inspection(s) will be made until completion of all contract requirements are effected. If the Architect is required to inspect the Contractor's work more than twice, the Contractor shall be liable to the Owner for the services performed by the Architect as a result of additional inspections.
2. The final inspection is intended to be a last review to determine that the work included in the contract has indeed been executed in accordance with all of the Contract Documents. Requests to render a final inspection of an incomplete building or to prepare the Contractor's "Punch List" will not be honored.

3. OPERATIONS AND MAINTENANCE INSTRUCTIONS

- a. The Contractor shall start up, test, adjust, balance and otherwise place in a satisfactory working condition all items of mechanical and electrical systems, and shall fully instruct representatives of the Owner in the care and operation of such systems.
- b. Instruction of the Owner's Maintenance Supervisor in the proper methods of cleaning and maintaining all the finished surfaces and the proper methods of replacement of the consumable items such as filters, light bulbs, washers, etc., shall be a part of this work.

4. CONTRACT CLOSEOUT DOCUMENTS

- a. After Execution of Certificate of Substantial Completion, and prior to submittal of Final Application for Payments, the Contractor shall submit the following documents to the Architect:
 1. Contractor's notarized affidavit that all payrolls, bill and materials, equipment, and other indebtedness connected with the work have been paid.
 2. Notarized Certificates of Waiver of Liens for himself, each Subcontractor, each material supplier or person furnishing materials or services to the project.
 3. List of subcontractors and major material suppliers including address, telephone number, and name of individual to contact.
 4. Validated warranties and notarized copies of all guarantees for equipment and materials specifically called for in the Contract Documents.

5. Consent of Surety to Final Payment.
 6. Fire Underwriters Certification (where applicable).
 7. Conformed Construction Drawings (As-builts), per section 01720.
 8. Record copy of each shop drawing or installation diagram.
 9. Operating manual (three (3) sets) assembled and bound, each containing:
 - a. Explanatory brochures of all equipment.
 - b. Catalog cut.
 - c. Wiring diagrams.
 - d. Instruction sheets for operation and maintenance.
 10. Guarantees:
 - a. Standard guarantee as per attached form.
 - b. Additional specific guarantees required by Technical Section of Contract Documents.
 - c. Manufacturer's warranties together with list of all items of equipment of material carrying warranty.
- b. Package all items properly indexed and deliver to Architect for review and transmittal to Owner.

5. EMERGENCY REPAIRS

During a valid warranty period, if the Contractor is unable or unwilling to respond immediately to make emergency repairs under conditions which the Owner may determine to be an emergency situation, the Owner reserves the right, and the Contractor recognizes such right, to make such emergency repairs and then to bill the Contractor for a fair and reasonable amount in reimbursement for such repairs.

6. CERTIFICATE OF SUBSTANTIAL COMPLETION

Certificate of Substantial Completion, A.I.A. Document G704, is included herein for review by the Contractor. This document shall be executed in triplicate when the work is sufficiently complete to warrant issuance of this document by the Architect.

7. The following two pages are the Contractor's Guarantee and shall be submitted along with the required Closeout Documents.

7. CONTRACTOR'S GUARANTEE

CONTRACTOR'S NAME AND ADDRESS

OWNER'S NAME AND ADDRESS

PROJECT: _____

LOCATION: _____

CONTRACT FOR: _____

CONTRACT DATE: _____

The Contractor hereby guarantees that all Work performed and/or materials installed under the above referenced contract is of the quality that will comply with all specific requirements of the contract documents. In accordance with AIA A201 part 3.5.3, The Contractor hereby guarantees to the Owner that, as of the date the Owner takes possession and with respect to the Contractor's Work, the Project is built and constructed in accordance with the Drawings and Specifications. These warranties shall terminate one year after the Owner takes possession, except that such warranties shall survive until the earlier of the time provided by law or as set out in the Specifications or the date which is three years after the date the Owner takes possession, as to the defective conditions (including, without limitation, conditions which do not comply with the Drawings and Specifications or applicable law) which could not be discovered by Owner and/or Architect in the exercise of reasonable care within one year after the Owner takes possession. Should the Owner and/or Architect discover any deficiency that requires repair and/or replacement, Contractor shall correct such deficiency to their respective satisfaction within thirty (30) days following receipt of a notice from the Owner or Architect, at Contractor's sole cost and expense. This does not waive stipulation of other clauses which specify guarantee periods in excess of the obligations herein.

It is further agreed that if, after due inspection, the Architect, as provided in the General Conditions of the Contract for Construction, shall decide that the replacement or repair of any of the Work is, in his opinion, necessary, such defective Work will be repaired or removed and replaced with New Work, meeting all requirements of the Contract Documents, same being done promptly and without expense to the Owner. Repairs and replacements are to include all costs of replacing or repairing other work damaged by the removal and replacements of the work covered by this guarantee and all costs necessary for restoring any portion of the building and its contents which are damaged due to defects in this Contractor's Work or materials.

The Contractor agrees to perform all corrective work necessary promptly upon receipt of written notification from the Owner unless the Owner has previously

given the Contractor a written acceptance of such condition.

The Contractor stipulates and agrees that if he fails or neglects to carry out promptly the provisions of this guarantee or any part thereof, the Owner may cause all defects to be remedied and all repairs to be made without further notice to the Contractor and shall charge to and recover the expense thereof from the Contractor and/or Sureties.

Such decisions as the architect shall render in connection with this guarantee are subject to the provisions of the General Conditions.

CONTRACTOR:

CORPORATE SEAL:

BY: _____

DATED: _____

STATE OF NEW YORK, COUNTY OF _____ ss:

On the _____ day of _____, 20____, before me personally came

_____, to me known, who being by me duly sworn, did depose and say that he resides at _____

_____, that he is the _____ of _____, the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by order of the Board of said corporation, and that he signed his name thereto by like order.

STATE OF NEW YORK, COUNTY OF _____ ss:

On the _____ day of _____, 20____, before me personally came

_____, to me known, and known to me to be the individual described in, and who executed the foregoing instrument, and _____ acknowledged to me that _____ executed same.

NOTARY PUBLIC, State of New York

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01710 - FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

- A. Each prime contractor shall at all times during the progress of the work keep the building and site free from accumulation of rubbish.
- B. Each prime contractor shall provide final cleaning of those areas of site and structure (exterior and interior) involved in the work of his respective contract immediately before final inspection.

1.02 PROTECTION AND CONTROL

- A. Fire Protection:
 - 1. Store volatile waste removed in final cleaning in covered metal containers, and remove from premises to comply with local and/or state ordinances and OSHA.
 - 2. Gasoline and fuel oil storage facilities shall be located and maintained in full compliance with local and/or state ordinances and OSHA.
- B. Pollution Control:
 - 1. Conduct clean up and disposal operations to comply with local ordinances and/or state ordinances and OSHA anti-pollution laws.
 - 2. Burning or burying of rubbish and waste materials on the project site is not permitted.
 - 3. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS:

- A. Use only cleaning materials recommended by manufacturer or surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 FINAL CLEANING:

- A. General:
 - 1. Use experienced workmen, or professional cleaners, for final cleaning.
 - 2. Maintain cleaning until the building, or portion thereof, is occupied by the Owner.
- B. Remove grease, dirt, dust, stains, labels, fingerprints, and other foreign materials, from interior and exterior surfaces.
- C. Repair, patch, and touch up marred surfaces to match adjacent finishes.
- D. Wash all glass installed as work of this contract.
- E. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
- F. Vacuum clean carpeted and similar soft surfaces.
- G. Clean resilient and hard surface floors as recommended by manufacturer.
- H. Clean surfaces of equipment; remove excess lubrication.
- I. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.
- J. Clean light fixtures and lamps.
- K. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.
- L. Remove waste, debris, and surplus materials from site. Clean grounds; remove stains, spills and foreign substances from paved areas and sweep clean. Rake clean other exterior surfaces.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01720 - CONFORMED CONSTRUCTION DOCUMENTS (AS-BUILTS)

PART 1 - GENERAL

1.01 GENERAL:

- A. Submit Conformed Construction Documents as required by Section 01700 herein specified and obtain written receipt from Architect.
- B. Each prime contractor shall, upon completion of the construction work, furnish the Owner with three (3) paper sets and two (2) electronic copies (PDF acceptable) of Conformed Construction Documents.
 - 1. The Contractor shall either use and reproduce the documents they are entitled to via the contract or they shall request and pay for additional sets from the Architect.
 - a. Electronic drawing files, AutoCAD format, may be available, at the discretion of the Architect, for a cost of \$25.00 per drawing. Contractors requesting this service will be required to sign a disclaimer. Request for electronic files must be made in writing to the Architects office. This request must include a specific list of drawings required in this format. In response, the architect will verify the drawings requested and will forward the disclaimer for signature. Electronic files will be released upon receipt of payment and a fully executed disclaimer.
 - 2. Incorporate all changes due to addenda modifications, change orders, field conditions and record actual locations of all items clearly and neatly. Submit prints when requested by the Architect for interim approval. Review may be made periodically during the job.
- C. The Architect will review Conformed Construction Documents prior to transmittal to Owner. If in the Architect's opinion, the submitted Conformed Construction Documents are lacking or inadequate, the Contractor shall revise and resubmit accordingly.

1.02 BUILDING CONSTRUCTION AND RECONSTRUCTION:

- A. General Construction:
 - 1. Incorporate plan changes, structural changes, and general building layout changes. For buried construction, include tie dimensions.
- B. Mechanical Construction:
 - 1. Incorporate ductwork and revisions/re-routing, registers and diffusers, piping runs, valve locations and identification, pump locations and identification, and equipment location. For buried construction, include tie dimensions.

C. Electrical Construction:

1. Incorporate large conduit runs, switchgear and panel locations, equipment locations, and controls locations. For buried construction, include tie dimensions.

D. Plumbing Construction:

1. Incorporate above ground and underground piping runs, clean-outs, and valve locations and identification. For buried construction, include tie dimensions.

1.03 SITE WORK:

A. Parking Lot, Pavement, Fields and General Site Construction:

1. Provide a survey, signed and sealed by NYS licensed Land Surveyor. Mark-ups of the Construction Documents will not be accepted unless agreed to in advance by the Architect for small-scope projects only.
 - a. If a land survey of existing conditions is provided in the Construction Documents, the contractor shall update that land survey as the basis of the as-built, utilizing the surveyor that performed said original survey.
2. Incorporate layout changes, drainage structure locations, piping locations, invert elevations, fences, and topography.
 - a. If site work is relevant to a new building or building addition, provide actual finish floor elevations at all doorways, and actual building perimeter locations and dimensions.

B. Utility Service Construction:

1. Provide a survey, signed and sealed by NYS licensed Land Surveyor. Mark-ups of the Construction Documents will not be accepted unless agreed to in advance by the Architect for small-scope projects only.
 - a. If a land survey of existing conditions is provided in the Construction Documents, the contractor shall update that land survey as the basis of the as-built, utilizing the surveyor that performed said original survey.
2. Incorporate layout changes, electrical primaries and secondaries, transformers, water services, gas services, sewer lines, and sanitary systems with leaching structure locations, piping locations, and invert elevations.
 - a. Include tie dimensions to visible above ground elements for buried construction.

END OF SECTION

DIVISION 3 - CONCRETE

SECTION 03300 - CAST-IN-PLACE CONCRETE WORK

PART 1 - GENERAL



1.01 GENERAL REQUIREMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 SCOPE/SUMMARY

- A. In general, the extent of concrete work is shown on the drawings. Provide all labor, materials, equipment, services, and perform all operations required to complete the installation of all work of this section and related work as indicated on the drawings and specified herein, including, but not necessarily limited to, the following:

1. Concrete footings, pile caps, grade beams, foundations, and walls.
2. Concrete steps, platforms, ramps, equipment pads.
3. Interior concrete slabs on grade or fill and elevated slabs.
4. Exterior concrete on grade: Curbs, walks, plazas, stairs, ramps and driveway aprons.
5. Expansion, control and isolation joints in concrete work.
6. Porous fill and vapor barrier for slabs on grade or fill.
7. Floor hardening treatment for interior exposed cement floors and base.
8. Grouting of bearing plates, leveling plates, miscellaneous lintels, and equipment supported on concrete.
9. All forms and reinforcing required for work of this section.
10. Cut, patch, finish, and point concrete and cement work.
11. Pre-molded filler at intersection of floor slabs and exterior wall, and where otherwise indicated (typical at all points abutting vertical surfaces).
12. Installation of water stop material where indicated when necessary.

- B. Work not included: The following items of related work are specified in other sections or contracts.

1. Furnishing of hanger inserts, anchors, leveling plates,

sleeves, conduits, etc.

2. Waterproofing and damp proofing.

1.03 RELATED SECTIONS

A. Related Sections:

1. 01450 - Testing Laboratory
2. 01451 - Tests, Inspections, Special Inspections, Quality Assurance Plan
3. 02105 - Stake Out
4. 02200 - Earth Work
5. 03650 - Underlayment Concrete
6. 04200 - Unit Masonry
7. 05120 - Structural Steel
8. 06100 - Rough Carpentry
9. 07190 - Under Slab Vapor Barrier
10. 07200 - Building Insulation

1.04 SUBMISSIONS

A. All submissions to be made in accordance with Section 01300 Submissions.

B. A concrete mix design: Submit laboratory test reports of concrete materials and mix design for each strength of concrete required on the project. Design data shall clearly identify the testing laboratory and provide 28 day strength testing reports representing mix proposed inclusive of all admixtures.

1. Mix design shall also include the following information;

- a. Minimum design strength intended.
- b. Cement content
- c. Water content
- d. Slag content
- e. Water cement ratio
- f. Maximum aggregate size
- g. Coarse aggregate content
- h. Fine aggregate content
- i. Air entrainment by volume
- j. Adjustment for aggregate moisture slump
- k. Tested flexural strength
- l. Tested compressive strength

2. Additional inclusions if required on job:

- a. Admixtures
- b. Water reducers
- c. Accelerators
- d. Retarders
- e. Fibers
- f. Colorants
- g. Special purpose admixtures
- h. Corrosion inhibitor
- i. Viscosity modifiers

- C. Product Data: Submit manufacturer's product data for all materials and items required for the proposed Scope of Work. Including, but not limited to: concrete mix components, reinforcement and forming accessories, wall sleeves, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, hardener/sealers, vapor barriers, non-shrink grit, etc. Product data for materials and items not listed above will be submitted upon the request of the Architect.
- D. Shop Drawings-Reinforcement: Submit complete and accurate shop drawings for approval before any work is executed. The shop drawings submitted by the Contractor shall be independently prepared for him by a Professional Engineer licensed to practice in the State of New York or otherwise within the state where the project is to be constructed and shall completely show the following:
1. Foundation plans and details, including but not limited to: pier plan details, stair sections, exterior wall elevation drawings which show all reinforcing, top of wall elevations, brick shelves & shelf elevations, tops of piers, bottom of footings, stepped footings and elevation changes, bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
 2. Floor slab plan indicating elevation variations, recesses, control joints, isolation joints, expansion joints and any proposed cold joints and details of each.
 3. Bending and tying diagrams, including typical corners,
 4. Sizes and spacing of members, relationship to contiguous work, fabrication, bending, and placement of concrete reinforcement.
 5. General notes and legends as required.
 6. Drawings shall comply with the latest version of ACI 315 Details and Detailing of Concrete Reinforcement.
 7. Any and all other pertinent information.
 8. Shop drawings must be signed and sealed by licensed professional engineer.
- E. Samples: Submit samples of materials only if requested by the Architect, including names, sources, and descriptions.
- F. Material Certificates: Provide material certificates in lieu of laboratory test reports when permitted by Architect. Material certificates shall be signed by the NYS-licensed Professional Engineer who prepared the shop drawing submittal, certifying that each material item complies with, or exceeds, specified

requirements.

G. LEED Submittals, for LEED projects submit the following:

1. Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 01352 "LEED Requirements."
2. Credit MR 7: If plywood forms are used, Contractor must submit documentation that the plywood used contains no urea-formaldehyde and that the plywood meets the requirements of LEED MR Credit 7, Certified Wood, by providing wood certification documentation, including chain-of-custody documentation from the manufacturer declaring conformance with the Forest Stewardship Council (FSC) guidelines for certified wood building components.
3. Manufacturer's verification that steel reinforcement contains at least 90% combined post-consumer and post-industrial recycled content.
4. Manufacturer's verification that VOC content of interior concrete sealer is less than 250 g/L.

1.05 GENERAL REQUIREMENTS AND QUALITY ASSURANCE

A. Codes and Standards: Comply with the provisions of the latest version of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. Concrete Reinforcing Steel Institute (CRSI), *"Manual of Standard Practice."*
2. American Society for Testing and Materials (ASTM) Latest Versions:
 - a. ASTM C 33 *"Specification for Concrete Aggregates."*
 - b. ASTM C 39 *"Test Method for Compressive Strength of Cylindrical Concrete Specimens."*
 - c. ASTM C 42 *"Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete."*
 - d. ASTM C 94/C94 M-00 *"Standard Specification for Ready-Mix Concrete."*
 - e. ASTM C 150 *"Specification for Portland Cement."*
 - f. ASTM A 185 *"Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement."*
 - g. ASTM C 260 *"Specification for Air-Entraining Admixtures for Concrete."*
 - h. ASTM C 309 *"Specification for Liquid Membrane-Forming Compounds for Curing Concrete."*

- i. ASTM A 615 *"Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement."*

3. American Concrete Institute (ACI): Latest Versions

- a. ACI 117 *"Standard Tolerances for Concrete Construction and Materials."*
- b. ACI 211 *"Recommended Practice for Selecting Proportions Concrete."*
- c. ACI 301 *"Specifications for Structural Concrete for Buildings."*
- d. ACI 302 *"Guide for Concrete Floor and Slab Construction."*
- e. ACI 304 *"Recommended Practice for Measuring, Mixing and Placing Concrete."*
- f. ACI 305 *"Hot Weather Concreting."*
- g. ACI 306 *"Cold Weather Concreting."*
- h. ACI 315 *"Details and Detailing of Concrete Reinforcement."*
- i. ACI 318 *"Building Code Requirements for Reinforced Concrete."*
- j. ACI 347 *"Recommended Practice for Concrete Formwork."*

B. Quality Control Testing During Construction:

- 1. The Owner will employ an independent testing laboratory to perform tests and to submit test reports. The contractor will be responsible for contacting the testing laboratory to arrange for all sampling, observation and testing. The Owner will pay for all passing tests; all failed tests and any additional testing required due to failed tests will be the responsibility of the contractor.
- 2. Sampling and testing for quality control during placement of concrete shall include the following as appropriate to scope, as directed by the Architect and in coordination with Section 01451.
- 3. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge per truckload or batch of each type of concrete; additional tests when concrete consistency seems to have changed. See 2.05G for slump limits.
 - b. Air Content: ASTM C 173, volumetric method for

lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each days' placement of each type of air-entrained concrete.

- c. Concrete Temperature: Test hourly when air temperature is 40°F (4°C) and below, and when 80°F (27°C) and above; and each time a set of compression test specimens are made.
 - d. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 - e. Compressive Strength Tests: ASTM C 39; one set for each day's placement exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - 1. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than five are used.
 - f. When total quantity of a given class of concrete is less than 50 cubic yards, strength test may be waived by Architect if, in his judgement, adequate evidence of satisfactory strength is provided.
 - g. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 - h. At the discretion of the Architect the strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
4. Test results will be reported in writing to the Architect, Structural Engineer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions, and materials, compressive breaking strength and type of

break for both 7-day tests and 28-day tests.

5. Non-destructive Testing: Impact hammer, sonoscope, or other non-destructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
 6. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.
- C. The Contractor shall provide a storage box to be used exclusively for the storage and curing of concrete test specimens. This box shall be substantially constructed, made of 1" thick T & G lumber, well braced to prevent warping, or 1/2" thick plywood (exterior grade) may be used. Box shall be provided with a hinged cover and padlock. Storage box shall be so constructed and located on the project site that its air temperature when containing concrete specimens will remain between 60° and 80°F. During the first 24 hours that any test specimens are in the box, electric heating cables or other approved means shall be provided to maintain this temperature during freezing weather. The storage box shall be placed on the site where approved, in location such that it will not be subject to any vibration or disturbance. Storage box shall not be placed in any building or shanty while it is being used for storing specimens.
- D. Should the average strength of the test cylinders fall below the required strength, the Architect may require changes in the proportion to apply to the remainder of the work or may require load tests and/or cores at the Contractor's expense on the portion of the structure which fails to develop the required strength or may require additional curing, the load test shall conform to the requirements of the Building Code Requirements for Reinforced Concrete (ACI 318, latest edition). If the concrete does not meet the specified requirements, the Architect may condemn such concrete already in place and the Contractor, at his own expense, shall remove such condemned concrete and replace same with new concrete to the satisfaction of the Architect. Use of high early strength cement will not be permitted without written approval of the Architect.

1.06 PROJECT CONDITIONS

- A. General: The contractor shall ensure that all proper project conditions are in place, ready for the setting of forms, reinforcement and subsequent concrete pouring, prior to the commencement of the work. Commencement of work constitutes contractor acceptance of all existing conditions.

1.07 CONTROLLED CONCRETE

- A. Concrete shall be composed of Portland Cement, fine aggregate,

coarse aggregate, and water or as otherwise composed via approved mix design.

1. Additional materials may include: slag, admixtures, fibers, colorants, or special purpose admixtures.
- B. All concrete, unless otherwise specified or called for on the drawings, shall be controlled concrete as defined and regulated in the local building code and by the American Concrete Institute and its **ultimate compressive strength at the end of 28 days shall be not less than 4,000 pounds per square inch for foundations, walls and footings, 4,500 pounds per square inch for slabs-on-ground elevated slabs, and other building concrete, and 4,500 pounds per square inch for exterior concrete including, but not limited to, sidewalks, stairs, ramps, driveway aprons and curbing, unless otherwise indicated on structural drawings.**
- C. Before the work is begun, the Contractor shall have preliminary trial tests made by a laboratory approved by the Architect to determine the mixture required to give the strength specified. Concrete shall be designed in accordance with the A.C.I. *Standard Recommended Practice for Selecting Proportions for Concrete* (ACI-513) to produce the strength required. Concrete shall be so designed that the concrete materials will not segregate nor shall excessive bleeding occur. Tests shall be made in accordance with ASTM C-39. The laboratory trial mixture for each mix design shall develop a concrete of compressive strength at 28 days of 1,200 psi higher than the required minimum for each of the strengths indicated to be acceptable for use in the field, but in no case shall cement content be less than 6 bags per cubic yard for 4,000 psi and 6 1/2 bags for 4,500 psi concrete. The proposed mixture must be approved by the Architect before the Contractor proceeds with the work.
- D. Upon approval by the Architect, the Contractor will be allowed to proceed with the work if the laboratory trial mixture develops a compressive strength of 70% of the required ultimate strength at the end of seven (7) days.
- E. If, during the progress of the work, it is found that the required workability and strength cannot be attained with the materials furnished by the Contractor, the Architect may order such changes in proportions or materials or both as may be necessary to secure the desired properties.
- F. The proportions of aggregate to cement shall be such as to produce a mixture which will work readily into the corners and around reinforcement but without permitting the materials to segregate or excess free water to collect on the surfaces. The combined aggregates shall be of such composition of sizes that when separated on the No. 4 standard sieve, the weight passing the sieve (fine aggregate) shall be not less than 40% or greater than 50% of the total, unless otherwise directed. Maximum size of coarse aggregate in slab, beams, and columns shall be 3/4" and in walls and footings 1 1/2".
- G. The source of supply of the aggregate shall not change during the

course of the job without previous notice to the Architect, and the materials from any new source shall be subject to acceptance or rejection based upon tests to be made by the Testing Laboratory at the Contractor's expense.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Protect materials delivered from the elements and from otherwise being damaged on site.
- B. Any materials damaged on site due to improper delivery, storage or handling shall not be incorporated in the project and shall be replaced at no cost to the Owner.
- C. Deliver, store and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units which will leave no metal closer than 1-1/2" to surface.
 - 1. Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface.

2.02 REINFORCING MATERIALS

- A. Reinforcing Bars: All reinforcing steel shall conform to ASTM A615, Grade 60, deformed (60 KSI yield stress) and be rolled from intermediate grade new steel billets.
- B. Welded Wire Fabric: All reinforcement mesh shall be electric-welded wire fabric with an ultimate tensile strength of not less than 55,000 pounds per square inch. All reinforcement mesh shall conform to ASTM A-185.
- C. Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing

bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications (brick is not acceptable other than for slabs on ground).

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs. Precast concrete bricks are acceptable for slab on ground construction.
 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).
 3. Certified copies of mill reports shall accompany all deliveries of reinforcing steel, identified to indicate the minimum yield strength of the furnished bars.
 4. Copies of the manufacturer's affidavit shall accompany all deliveries of welded wire fabric certifying its minimum tensile strength.
- D. For LEED projects all steel reinforcement to contain minimum 90% combined post-consumer and post-industrial recycled content.

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
1. Use one brand of cement throughout the project, unless otherwise acceptable to the Architect.
- B. For LEED projects Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
1. Provide no more than 25% within the mix for use on exposed slabs on grade, elevated slabs, sidewalks, ramps and stairs.
 2. Provide no more than 40% within the mix for use on foundation walls, grade beams, piers, footings, etc.
- C. Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.
1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
 2. Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect.
 3. Coarse aggregates for all stone concrete and fine aggregate shall conform to ASTM Designation C33 - well graded from fine to coarse with the specified limits. The maximum size of the aggregate 3/4" in slabs, beams and columns and 1-1/2" in

walls and footings and not larger than one-fifth (1/5) of the narrowest dimension between the sides of the forms of the member for which the concrete is to be used, not larger than three-fourths (3/4) of the minimum clear spacing between reinforcing bars.

4. Coarse aggregate for stone concrete shall consist of crushed stone or natural or crushed gravel, having clean, hard, strong, uncoated particles free from injurious amounts of soft, thin, elongated, or laminated pieces, alkali, organic, or other deleterious matter.
5. Fine aggregate for stone concrete - sand, stone screenings, or other inert material with similar characteristics having clean, strong, durable, uncoated grains, and free from lumps, salt, or flaky particles, clay, shale, alkali, organic matter, or other deleterious substance.
6. Aggregates shall be graded as follows:

Coarse Aggregate

Percent Retained

1" sieve	0
3/4" sieve	0 - 10
3/8" sieve	45 - 80
No. 4 sieve	90 - 100

Fine Aggregates

By Weight Passing

Passing 1/4" square opening	100%
Passing No. 4 sieve	95 - 100%
Passing No. 16 sieve	50 - 85%
Passing No. 50 sieve	15 - 25%
Passing No. 100 sieve	2 - 8%

- D. Anti-shrinkage grout to be used for grouting in of bearing plates, anchors, and inserts shall be Master Builders "Embecco" premix or approved equal.
- E. Admixtures shall be used only with the prior written approval of the Architect. All mixtures specified herein or proposed for use by the Contractor shall be of a manufacturer as approved by the Architect and used strictly in accordance with the manufacturer's directions.
 1. A set-controlling, water-reducing admixture: "Pozzolith" manufactured by Master Builders or approved equal.
 2. Air-entraining Admixture: ASTM C-260, certified by manufacturer to be compatible with other required admixtures.
 - a. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 1. "Air-Mix"; Euclid Chemical Company.

2. "Sika Aer"; Sika Corporation.
3. "MB-VR or MB-AE"; Master Builders.
4. "Darex AEA" or "Daravair"; W.R. Grace.
5. "Edoco 2001 or 2002"; Edoco Technical Products.
6. "Air-Tite"; Gifford Hill/American Admixtures.

b. Air-entraining admixtures shall be used for all concrete exposed to weather.

F. Water: Water used in mixing concrete shall be clean, potable (drinkable), and free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious materials. (complying with ASTM C94).

2.04 RELATED MATERIALS

A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

1. Polyethylene sheet not less than 8 mils thick.

B. Non-shrink Grout: CRD-C 621, factory pre-mixed grout.

1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

a. Non-metallic:

1. "Set Grout"; Master Builders.
2. "SonogROUT"; Sonneborn-Rexnord.
3. "Euco-NS"; Euclid Chemical Company.
4. "Supreme"; Gifford-Hill/American Admixtures.
5. "Crystex"; L & M Construction Chemical Company.
6. "Sure-Grip Grout"; Dayton Superior Corporation.
7. "Horngrout"; A.C. Horn, Inc.
8. "Five Star Grout"; U.S. Grout Corporation.

C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per square yard, complying with AASHTO M 182, Class 2.

1. For LEED projects Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

a. Provide no more than 25% within the mix for use on exposed slabs on grade, elevated slabs, sidewalks, ramps and stairs.

b. Provide no more than 40% within the mix for use on foundation walls, grade beams, piers, footings, etc.

D. Moisture-Retaining Cover: One of the following, complying with ASTM C 171:

1. Waterproof paper.

2. Polyethylene film.
 3. Polyethylene-coated burlap.
- E. Liquid Membrane-Forming Curing Compound: Concrete slabs shall be cured by means of pigmented curing compound of a type not affecting adhesion of resilient flooring or other surface finish, of approved manufacture, conforming to ASTM C-309, and applied in strict accordance with manufacturer's directions. Liquid type membrane-forming curing compound complying with ASTM C 309, Type 1, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.
1. Available Products: Subject to compliance with requirements, products, which may be incorporated in the work include, but are not limited to, the following:
 - a. "Masterseal"; Master Builders.
 - b. "A-H 3 Way Sealer"; Anti-Hydro Waterproofing Company.
 - c. "Ecocure"; Euclid Chemical Company.
 - d. "Clear Seal"; A.C. Horn, Inc.
 - e. "Sealco 309"; Gifford-Hill/American Admixtures.
 - f. "J-20 Acrylic Cure"; Dayton Superior.
 - g. "Spartan-Cote"; The Burke Company.
 - h. "Sealkure"; Toch Div. - Carboline.
 - i. "Kure-N-Seal"; Sonneborn-Rexnord.
 - j. "Polyclear"; Upco Chemical/USM Corp.
 - k. "L & M Cure"; L & M Construction Chemicals.
 - l. "Klearseal"; Setcon Industries.
 - m. "LR-152"; Protex Industries.
 - n. "Hardtop"; Gifford-Hill.
 2. Liquid membrane curing compounds may only be used on slabs where there is no other finish flooring material to be installed.
- F. Bonding Compound: Polyvinyl acetate or acrylic base.
1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. Polyvinyl Acetate (Interior Only):
 1. "Euroweld"; Euclid Chemical Company.
 2. "Weldcrete"; Larsen Products Corporation.
 - b. Acrylic or Styrene Butadiene:
 1. "J-40 Adbond Bonding Agent"; Dayton Superior Corp.
 2. "Everbond"; L & M Construction Chemicals.
 3. "Hornweld"; A.C. Horn, Inc.
 4. "Sonocrete"; Sonneborn-Rexnord.
 5. "Acrylic Bondcrete"; The Burke Company.
 6. "SBR Latex"; Euclid Chemical Company.
 7. "Daraweld C"; W.R. Grace.

- G. Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," or "Class" to suit project requirements.
1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
- a. "Thiopoxy"; W.R. Grace.
 - b. "Epoxitite"; A.C. Horn, Inc.
 - c. "Edoco 2118 Epoxy Adhesive"; Edoco Technical Products.
 - d. "Sikadur Hi-Mod"; Sika Chemical Corporation.
 - e. "Euco Epoxy 452 or 620"; Euclid Chemical Company.
 - f. "Patch and Bond Epoxy"; The Burke Company.
 - g. "Concresive 1001"; Adhesive Engineering Company.
- H. Joint Fillers / Filler Strips: Joints for slabs on ground shall be formed with preformed, non-exuding bituminous fiber expansion filler, which shall extend full length and depth of slabs. Vertical expansion joints shall be constructed complete with water dams or waterstops and joint filler.
- I. Vapor Barriers: Under typical interior slabs where finished flooring does not involve wood, provide non-woven, polyester, reinforced, polyethylene coated sheet of 15 mil thickness.
1. Vapor barrier membrane must have the following properties:
- a. Permeance as tested after mandatory conditioning (ASTM E 1745 paragraphs 7.1.2-5): less than 0.01 perms (gran/ft²/hr/in-Hg).
 - b. Other performance criteria:
 - 1. Strength: Class A (ASTM E 1745).
 - 2. Minimum thickness of plastic retarder material: 15 mils.
 - c. Basis of Design: Stego Wrap 15-mil Vapor barrier by Stego Industries, LLC.
 - d. Or Architect approved equal.
- J. Vapor barrier under interior slabs where finished flooring involves wood assemblies such as gymnasium and stages provide bituminous vaporproofing/waterproofing membrane.
1. Vapor barrier must have seven-ply, weather-coated, permanently bonded, semi-flexible bituminous core board composed of a 3-ply plasmatic matrix sealed between liners of asphalt-impregnated felt and a glass mat liner. Vapor barrier shall consist of an asphalt weather coat and covered with a polyethylene anti-stick sheet. Vapor barrier shall meet or exceed all requirements of ASTM E 1993-98 and shall have the following characteristics:

- a. Minimum permeance ASTM F1429, calibrated to ASTM E96, Water Method: 0.0011 Perms.
 - b. Tensile Strength ASTM E154, Section 9: 156 LBS. force.
 - c. Puncture Resistance ASTM E154: 149 LBS. force/inch.
 - d. Pre-molded Membrane® Vapor Seal with Plasmatic Core by W.R. Meadows, W.R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338. (800) 348-5976. (847) 683-4500. Fax (847) 683-4544. Website: www.wremeadows.com.
- K. Water Stops: Provide all waterstops similar to or equal to those as produced by *Greenstreak, Inc.*, as required by the drawings, either embedded in concrete, or across and/or along the joint, to form a watertight diaphragm that prevents the passage of fluid through the joint.
- L. All other materials as hereinafter specified. All set-in-place concrete elements (i.e. - pre-fabricated water stops, cast aluminum nosings, exterior stair components, etc.) shall be installed in conformance with their associated specification sections, and/or manufacturer's installation instructions if no specification is provided and in complete coordination with the work of this Section.

2.05 PROPORTIONING AND DESIGN OF MIXES

- A. Design mix of all concrete shall provide the following properties, as indicated on the drawings and schedules:
 - 1. 4,000 psi 28-day compressive strength; W/C ratio, 0.58 maximum (non-air-entrained), 0.46 maximum (air-entrained).
 - 2. 4,500 psi 28-day compressive strength; W/C ratio, 0.67 maximum (non-air-entrained), 0.54 maximum (air-entrained).
 - 3. Do not air entrain concrete for trowel finished interior floors and suspended slabs, including polished concrete floors. Do not allow entrapped air content to exceed 3 percent.
- B. Stone concrete shall weigh approximately 144 pounds per cubic foot. Exterior concrete, exposed to weather, shall have a water cement ratio not to exceed 6 1/2 gallons per sack of cement and an air entraining agent approved by the Architect to be added to obtain concrete with an air content not less than 4% nor more than 6% conforming to ASTM C-175, latest edition.
- C. Prepare design mixes for each type and strength of concrete laboratory trial batch methods as specified in ACI 301. Use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

- D. Submit written reports to Architect and Structural Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and accepted by the Architect.
- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the Owner and as accepted by the Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Architect before using in work.
- F. Admixtures: ONLY TO BE USED WITH PRIOR WRITTEN APPROVAL OF THE ARCHITECT!
1. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.
 2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F (10°C).
 3. Use high-range water-reducing admixture in pumped concrete, concrete for industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water/cement ratios below 0.50.
 4. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
 - a. Concrete structures and slabs exposed to freezing and thawing, de-icer chemicals, or subjected to hydraulic pressure.
 - b. 4.5 percent (moderate exposure).
5.5 percent (severe exposure) 1-1/2" maximum aggregate.
 - c. 4.5 percent (moderate exposure)
6.0 percent (severe exposure) 1" maximum aggregate.
 5. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
- G. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
1. Ramps, slabs, and sloping surfaces: Not more than 3".
 2. Reinforced foundation systems: Not less than 1" and not more than 3".

3. Concrete containing HRWR admixture (super-plasticizer): Not more than 8" after addition of HRWR to site-verified 2"-3" slump concrete.
4. Other concrete: Not less than 1" and not more than 4".

2.06 MIXING

- A. All concrete shall be machine mixed or transit mixed.
- B. Hand mixing will not be permitted unless approved by the Architect. Mixing shall conform to ASTM C-94 and ACI-304. On-site mixing will not be permitted unless approved by the Architect/Engineer.
- C. Machine mixing shall be done in an approved batch mixer. Sand and gravel shall be measured by weighing. Mixing shall be continued for at least one minute after all materials are in the mixing drum at a speed of not less than twelve nor more than eighteen revolutions per minute. The volume of the mixing materials per batch shall not exceed manufacturer's rated capacity of mixer. A water gauge shall be provided to deliver the exact predetermined amount of water for each batch. Mixing shall be continued for at least 1 minute for 1 cubic yard of concrete plus 1/4 minute for each additional cubic yard of concrete after all materials.
- D. Transit mix concrete shall conform to the specification and tests herein described and to ASTM C-94 and ACI-304, most current edition(s); and further provided that the central plant producing the concrete and equipment transporting it are, in the opinion of the Architect, suitable for production and transportation of controlled concrete. The maximum elapsed time between the time of the introduction of water and placing shall be one hour.
- E. Exterior concrete exposed to weather: Water cement ratio shall not exceed 6 1/2 gallons per sack of cement and an air-entraining agent approved by the Architect shall be added to obtain concrete with an air content not less than 4% nor more than 6% conforming to ASTM C-175, latest edition.
- F. Ready-mix Concrete: Comply with the requirements of ASTM C 94, and as specified herein.
 1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall notify the Architect, Construction Manager (when applicable) and the approved testing laboratory at least 24 hours in advance of the time he intends to use ready mixed concrete so that an inspector may be assigned to the plant to supervise the mix, and be available at the site to witness pour and sampling.

- B. With each delivery of concrete, furnish to the superintendent at the building site a delivery slip (certified by laboratory representative) showing mix, quantity of cement, fine and coarse aggregates, and water, and time of departure from the plant.
- C. Under no circumstances shall transit-mixed concrete be delivered from the plant, unless mix design has been approved by the Architect and inspector of testing laboratory. The approved plant and its operating equipment shall be under the supervision of the testing laboratory appointed by and directly responsible to the Architect.
- D. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.02 FORMS

- A. Design, erect, support, brace, and maintain form work to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.
- B. Design form work to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
- C. Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in the work. Use selected materials to obtain required finishes. Solidly butt joints and provide back up at joints to prevent leakage of cement paste.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
 - 1. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.
- F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Provisions for Other Trades: Provide openings in concrete formwork

to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, etc., or other debris just before concrete is placed. Retightening forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.03 PREPARATION OF FORM SURFACES

- A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.
- B. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- C. Thin form-coating compounds only with thinning agent of type, amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- D. Coat steel forms with a non-staining, rust preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.04 VAPOR RETARDER INSTALLATION

- A. Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour. Lap joints and seal with appropriate tape.
- B. All concrete slabs on grade or fill shall receive membrane placed on porous fill prior to placing reinforcing. Membrane shall be placed with 6" laps at ends and sides, and without tears or ruptures at the time concrete is placed thereon.
- C. Both standard vapor barrier and pre-molded membrane when applicable shall be installed in accordance with the manufacturers requirements.

3.05 PLACING OF REINFORCEMENT

- A. Comply with *Concrete Reinforcing Steel Institute's* recommended practice for "*Placing Reinforcing Bars*", for details and methods of reinforcement placement and supports, and as specified herein.
- B. All reinforcement shall be rigidly wired in place with adequate spacers and zinc coated tie chairs. Bar supports shall be not more than 4'-0" o.c. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete. Reinforcement for concrete slabs on ground or fill shall be supported on precast concrete bricks. On formwork, galvanized coated chairs or spacers shall be used.

- C. Reinforcement shall be placed so that where temperature shrinkage of bars occur, they shall be no closer to top of slab than 3/4". Coordinate with work under Electrical Contract so that conduits may be replaced to obtain this result.
- D. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as required.
- E. All reinforcement shall be bent cold. The minimum radius of bend shall be 4 diameters for bars 5/8" round or less and 6 diameters for larger bars.
- F. Place reinforcement to obtain at least minimum coverage for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- G. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace overlaps with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.
- H. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier in accordance with manufacturer's requirements before placing concrete.
- I. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coating with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.
- J. Zinc-Coated Reinforcement: Repair, cut and damaged zinc coatings with zinc repair material according to ASTM A 780. Use galvanized steel wire ties to fasten zinc-coated steel reinforcement.

3.06 EXPANSION JOINTS

- A. Joints for slabs on ground shall be formed with preformed, non-exuding bituminous fiber expansion filler, which shall extend full length and depth of slabs.
- B. Vertical expansion joints shall be constructed complete with water dams or waterstops and joint filler.
- C. Joint material in exterior concrete, sidewalks, plazas, stairs, ramps, curbs, etc. shall be held 1/4" from finished surface and finished with approved traffic grade sealant.

3.07 OTHER JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints to girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls as indicated per typical detail. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construction contraction joints for a depth as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2 mm-) wide joints 1" deep into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished

concrete surface where joint sealants, specified in Division 07 Section "Joint Sealant," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip section together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.08 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
1. Install reglets to receive top edge of foundation sheet waterproofing, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
 2. Install anchor bolts, accurately located, to elevations required.
- B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.09 CONCRETE PLACEMENT

- A. The Contractor shall notify the Owner, the Architect, the Construction Manager (when applicable) and the testing laboratory at least 48 hours in advance of the time he intends to place concrete in order to afford them the opportunity to observe placing operations. The Contractor shall obtain the Architect's and testing laboratory's permission prior to placing concrete.
- B. All forms must be absolutely clean and free from shavings and dirt prior to starting concrete operations.
- C. Under no circumstances shall concrete be deposited in or under water, nor on muddy or frozen ground.
- D. Pre-placement Inspection: Before placing concrete, the Contractor shall inspect and complete all formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used. Protect adjacent finish materials against spatter during concrete placement.
1. Apply temporary protective covering to lower 2' of finished

walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement under any and all conditions of placement.

- E. General: Comply with ACI 304 *"Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete"* and as herein specified.
1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
 2. Before depositing new concrete against concrete which has set, the forms shall be re-tightened and the surface of the concrete placed earlier shall be thoroughly roughened, cleaned of all foreign matter and laitance, shall be slushed with water, slushed with a coat of neat cement grout, and the new concrete shall be placed before the grout has attained its initial set, or the work shall be performed in such other approved manner as will insure a thorough bonding to the work.
- F. All concrete must be placed as rapidly as possible after mixing and thoroughly spaded and rammed in place. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. All possible care is to be exercised to prevent honeycombing. Concrete shall be placed in layers not over 12" thick and shall not be dumped from height over three feet. Concrete that must be placed more than 3 feet below placement level shall be chuted at a slope of not more than 1 in 2 or deposited through elephant trunks.
- G. Concrete shall be placed in one operation up to temporary bulkheads, which shall be located, in general, at points of minimum shear.
- H. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 12" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
1. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 2. All structural concrete shall be placed with the aid of mechanical vibrators. The vibrators shall be of a type and design approved by the Architect and shall be capable of transmitting to the concrete not less than 3,000 impulses per minute. The vibration shall be sufficiently intense to visibly affect the concrete over a radius of at least 2'-0" around the point of application but shall not be applied long enough to segregate the ingredients. Insert and withdraw

vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. Enough vibration shall be used to cause all the concrete to flow or settle readily into place. The vibration shall be of internal type, applied directly to the concrete and not through the forms, except in sections too thin to permit the insertion of the internal type, in which case form vibration may be employed at the discretion of the Architect. Do not use vibrators to transport concrete inside forms.

- I. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
 - 1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 3. Maintain reinforcing in proper position during concrete placement operations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. For exterior placement such as sidewalks, plazas, driveway aprons, curbing and equipment pads where no vapor barrier is required, the subgrade shall be moist before placing concrete. Dry or dusty subgrades shall be moistened to a minimum depth of one inch (1") prior to placing concrete.
- J. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
 - 1. When air temperature has fallen to or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C), and not more than 80°F (27°C) at point of placement.
 - a. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - b. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

- c. Protection of Footings Against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.
- K. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified. Concrete placed in warm weather shall be kept well sprinkled with water for at least one week after placing, unless other approved curing methods are used. No concrete shall be placed when the atmospheric temperature is above 90°F.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 - a. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 - 3. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions, only upon approval of the Architect.

3.10 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or by other construction, unless otherwise shown or indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed to view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, immediately following form removal and not later than one day after form removal.

1. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
- D. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth form finish treatment.
1. Combine one part Portland cement to 1-1/2 parts fine sand by volume, and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.
 2. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off, smooth, and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.11 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
1. After placing slabs, plane surface to tolerances for floor flatness (F_F) of 15 and floor levelness (F_L) of 13. Slope surfaces uniformly to drains where required. After leveling, while still plastic, roughen surface before final set, with stiff brushes, brooms, or rakes to provide a profile amplitude of $\frac{1}{4}$ inch (6 mm) in one direction.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Check and level surface plant to tolerances of F_F 18 - F_L 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular

texture.

- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system and below wood flooring systems.
 - 1. After floating, begin first trowel finish operation using a hand or power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances according to ASTM E 1155 (ASTM E1155M) for a randomly trafficked floor surface. Grind smooth surface defects which would telegraph through applied floor covering system.
 - a. Specified overall values of flatness: (F(F)35, and levelness, F(L)25, with minimum local values of flatness F(F)24 and levelness F(L)17 for slabs on grade.
 - 2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm).
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with either thin-set or thick-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, sidewalks, plazas, aprons, curbs and ramps, and elsewhere indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- F. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms and ramps. Apply according to manufacturer's written instructions and as follows:
 - 1. Uniformly spread 25/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
 - 2. After broadcasting and tamping, apply float finish.
 - 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive

aggregate.

- G. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions as follows:
1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.
 2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
 3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting; keep continuously moist for not less than 7 days.
 2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
 3. The Contractor shall continuously protect cement finish floors from damage for the duration of the work by such means as approved by the Architect and shall leave same in perfect condition to receive other floor finishes or where exposed in the finished work, they shall be in perfect condition at completion and acceptance of the building.
- B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified as appropriate to finished condition of concrete surface.
1. Provide moisture curing by following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and continuously keeping wet. Place absorptive cover to

provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows:

- a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Provide curing and sealing compound to exposed interior slabs (no other finish materials) and to exterior slabs, walks, and curbs as follows:

- a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
- b. Do not use membrane curing and sealing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, vinyl tile, linoleum, glue-down carpet, etc.), painting, and other coatings and finish materials unless otherwise acceptable to the Architect.

C. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

- 1. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture retaining cover, unless otherwise directed.

3.13 REMOVAL OF FORMS

- A. Form work not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 24 hours after placing concrete, provided concrete is sufficiently hard not to be damaged by form removal operations and provided curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete-in-place unit concrete has achieved at least 70 percent of its 28-day design compressive strength.
 2. Remove forms only if shores have been arranged to permit remove of forms without loosening or distributing shores.
- B. Form facing material may be removed 4 days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.14 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new form work.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms close to joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to the Architect.

3.15 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and re-shoring.
1. Do not remove shoring or re-shoring until measurement of slab tolerances is complete.
- B. In multi-story construction, extend shoring or re-shoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and re-shores to avoid damage to concrete. Locate and provide adequate re-shoring support construction without excessive stress or deflection.

3.16 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer finishing machines and equipment.
 - 1. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.
- E. Pits, Trenches, etc.: Build all pits, pit cleanouts, trap pits, trenches, curbs, and pads as required by the drawings and by job conditions.
- F. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous watertight diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- G. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.17 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
 - 1. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Before placing cement mortar, thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
 - a. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture

irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains or other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

1. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Patching compounds may be used when acceptable to Architect.
4. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
5. Repair isolated random cracks and single holes not over 1" diameter by dry-pack method. Groove top of cracks and cutout holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
6. Perform structural repairs with prior approval of Architect

or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.

7. Repair methods not specified above may be used, subject to acceptance of Architect.

3.18 CUTTING, PATCHING, AND REMOVAL

- A. The Contractor shall be responsible for all cutting and patching of his work as required to accommodate work of this section and of other sections and contracts.
- B. Materials which have become damaged or have been condemned shall be removed from the site.

END OF SECTION

DIVISION 4 - MASONRY

SECTION 04200 - UNIT MASONRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK / SUMMARY:

- A. Extent of each type of masonry work is indicated on drawings and schedule.
- B. This Section includes unit masonry assemblies consisting of the following:
 - 1. Concrete unit masonry.
 - 2. Brick masonry.
 - 3. Decorative concrete masonry units.
 - 4. Pre-faced concrete masonry units.
 - 5. Natural stone.
 - 6. Concrete brick.
 - 7. Mortar and grout.
 - 8. Reinforcing steel.
 - 9. Masonry joint reinforcement.
 - 10. Ties and anchors.
 - 11. Miscellaneous masonry accessories.
- C. Related Sections include the following:
 - 1. 03300 - Cast-In-Place Concrete
 - 2. 05120 - Structural Steel
 - 3. 06100 - Rough Carpentry
 - 4. 07200 - Building Insulation
 - 5. 07231 - Air / Vapor Barrier System
 - 6. 07600 - Flashing and Sheet Metal
 - 7. 07900 - Caulking
 - 8. 07910 - Joint Sealers
 - 9. 08110 - Steel Doors and Frames
 - 10. 08121 - FRP Doors and Framing
 - 11. 08211 - Flush Wood Doors
 - 12. 08360 - Upward Acting Sectional Doors
 - 13. 08520 - Aluminum Windows

1.03 DEFINITIONS:

- A. Reinforced Masonry: Masonry containing horizontal joint reinforcing and reinforcing steel in grouted cells.

- B. Multi-Wythe Masonry: Masonry wall construction containing adjacent wythes of masonry with the same unit type without a cavity.
- C. Composite Masonry: Masonry wall construction containing adjacent wythes of masonry with different unit type without a cavity.
- D. Cavity Wall Masonry: Masonry wall construction containing adjacent wythes of masonry with different unit types separated with a continuous air space cavity in-between connected by metal ties.
- E. Structural Masonry: Masonry wall construction constructed to be the main supporting structure of other building components such as a floor or roof.

1.04 PERFORMANCE REQUIREMENTS:

- A. Provide structural unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.
- B. Determine net-area compressive strength (f'_m) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.05 SUBMITTALS:

- A. All Submittals shall be made in accordance with General Conditions Section G31.
- B. Product Data: Submit manufacturer's product data for each type of masonry unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.
- C. Shop Drawings: Submit shop drawings for the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
 - 3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement". Show elevations of reinforced walls.
 - 4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
 - 5. Self-Adhering Sheet Flashing & Waterproofing Membranes: Detail all proposed application conditions, Submit manufacturer's data for membrane, primers, sealants, adhesives and associated auxiliary materials. Prior to commencing the Work, submit manufacturer's complete set of standard details for waterproofing systems.

D. Samples: Submit samples of the following materials:

1. Unit masonry samples in small scale form showing full extent of colors and textures available for each type of exposed masonry unit required.
2. Face brick, in the form of straps of five or more bricks. Include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.
3. Colored masonry mortar samples showing full extent of colors available.
4. Decorative concrete masonry unit samples for each type of exposed masonry unit required; include in each set the full range of exposed color and texture to be expected in completed work.
5. Include size variation data verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances for brick where modular dimensioning is indicated.
6. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used. Show full extent of colors available.
7. Weep vents in color to match mortar color.
8. Accessories embedded in masonry.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and submission of materials in accordance with this section have been provided for review by the Architect and approved in writing.

F. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:

1. Masonry units. Include material test reports substantiating compliance with requirements.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of

ingredients.

5. Reinforcing bars.
 6. Joint reinforcement.
 7. Anchors, ties, and metal accessories.
- G. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports, per ASTM C 780, for mortar mixes required to comply with properties specification.
 2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- H. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- I. Cold-Weather Procedures: Submit a detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

1.06 QUALITY ASSURANCE:

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- D. Fire Performance Characteristics: Where indicated, provide materials and construction which are identical to those of assemblies whose fire resistance ratings have been determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- E. Field Constructed Mock-ups: Prior to installation of masonry work, erect sample wall panels to further verify selections made under sample submittals to demonstrate aesthetic effects and set quality standards for materials and execution, as well as for

color and textural characteristics of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials, and construction; build mock-ups to comply with the following requirements:

1. Locate mock-ups on site in locations indicated or, if not indicated, as directed by the Architect.
2. Build mock-ups for each type of exposed masonry in sizes of approximately 6' long by 4' high by full thickness, including face and back-up wythes as well as all accessories including but not limited to insulation and horizontal and vertical reinforcement.
3. Include a sealant-filled joint at least 16 inches long in exterior wall mockups.
4. Include through-wall flashing; with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
5. Include metal/wood studs, sheathing, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup, when applicable.
6. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
7. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
8. Approval of mockups is for construction of full assembly, color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
9. Protect mock-ups from the elements with weather resistant membrane.
10. Retain mock-ups during construction as standard for judging completed masonry work. When directed, demolish mock-ups and remove from site.
11. Pre-installation Conference to be after construction of mock-up but before proceeding with masonry work. Conduct pre-installation conference at Project Site.

1.07 FIELD QUALITY CONTROL:

- A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.
 1. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.
- B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
 1. Payment for these services will be made by Owner.
 2. Retesting of materials failing to comply with specified requirements

shall be done at Contractor's expense.

3. Refer to Specification Sections 01450 & 01451 for additional Special Inspection requirements.

- C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- D. Clay Masonry Unit Test: For each type of unit provided, per ASTM C 67.
- E. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.
- F. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for mortar air content and compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

1.08 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver masonry materials and accessories to project in undamaged condition.
- B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, or other causes.
- C. Store masonry units and cementitious material off the ground, on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If masonry units become wet, do not install until they are dry. Do not use cementitious materials that have become damp.
- D. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.
- E. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.
- F. Cold-applied elastomeric membranes should be stored in closed containers outdoors. Store membrane at temperature of 40°F and above to facilitate handling. Membrane contains petroleum solvents and are flammable; do not use near open flame. Store roll materials horizontally; store adhesives and primers at temperatures of 40°F and above to facilitate handling. Keep all solvents away from open flame or excessive heat.

1.09 PROJECT CONDITIONS:

- A. Protection of Work: During construction, cover top of walls,

projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress.

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
3. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.
4. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

B. Stain Prevention: Prevent grout, mortar, or soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings and wash down detergent.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold Weather Requirements:

1. Do not lay masonry units which are wet or frozen. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
2. Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.
3. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

D. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40°F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

F. Perform the following construction procedures while masonry work is progressing. Temperature ranges indicated below apply to air temperatures existing at the time of installation except for

grout. For grout, temperature ranges apply to anticipated minimum night temperatures. In heating mortar and grout materials, maintain mixing temperature selected within 10°F (6°C).

1. 40°F (4°C) to 32°F (0°C):

a. Mortar: Heat mixing water to produce mortar temperature between 40°F (4°C) and 120°F (49°C).

b. Grout: Follow normal masonry procedures.

2. Do not heat water for mortar and grout to above 160°F (71°C).

G. Protect completed masonry and masonry not being worked on in the following manner. Temperature ranges indicated apply to mean daily air temperatures except for grouted masonry. For grouted masonry, temperature ranges apply to anticipated minimum night temperatures.

1. 40°F (4°C) to 32°F (0°C):

a. Protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

2. 32°F (0°C) to 25°F (-4°C):

a. Completely cover masonry with weather-resistive membrane for at least 24 hours.

3. 25°F (-4°C) to 20°F (-7°C):

a. Completely cover masonry with weather-resistive insulating blankets or similar protection for at least 24 hours, 48 hours for grouted masonry.

4. 20°F (-7°C) and below:

a. Except as otherwise indicated, maintain masonry temperature above 32°F (0°C) for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps, or other methods proven to be satisfactory. For grouted masonry maintain heated enclosure to 40°F (4°C) for 48 hours.

H. Coordination: Ensure installation continuity of the waterproofing membranes scheduled for installation throughout the scope of this section. Work shall be so scheduled as to provide a watertight seal at the end of each working day on the areas worked upon during the day.

PART 2 - PRODUCTS

2.01 GENERAL

A. All specific products indicated within this section are to

establish a level of quality. Equivalency is permitted in accordance with General Municipal Law.

2.02 MASONRY UNITS, GENERAL:

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

2.03 CONCRETE MASONRY UNITS (CMU):

- A. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.
- B. Concrete Block: Provide units complying with characteristics indicated below for grade, type, face size, exposed face, and, under each form of block included, for weight classification.
 - 1. Size: Manufacturer's standard units with nominal face dimensions and thicknesses indicated on drawings.
 - 2. Type II, non-moisture controlled units.
- C. Hollow Load-Bearing Block: ASTM C 90 and as follows:
 - 1. Weight Classification: Lightweight
 - 2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. All components (aggregate, cement, etc.) of CMU must be harvested within 500 miles of project site. (Required for LEED Projects only)
 - 5. CMU to contain 20% post-industrial recycled content, by weight. (Required for LEED Projects only)
- D. Concrete Building Brick: ASTM C 55.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2500 psi.
 - 2. Weight Classification: Medium weight.
 - 3. Size (Actual Dimensions): 3-5/8 inches wide by 3-5/8 inches high by 7-5/8 inches long.
- E. Shapes: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. **All interior outside corners of CMUs shall have a 5/8" to 1" manufactured bullnosed edge. This requirement supercedes any details which may or may not be provided in the Contract Documents. All masonry bids shall include the cost of all necessary bullnose materials, at no additional costs to the Owner.**

2.04 VENEER BLOCK:

- A. General: Comply with referenced standards and other requirements indicated below applicable to each form of concrete masonry unit required.
 1. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 2. Provide square-edged units for outside corners, except where indicated as bullnose.
 3. Provide corner units where applicable and available.
- B. Concrete Block: Provide units complying with characteristics indicated below for grade, type, face size, exposed face, and, under each form of block included, for weight classification.
 1. Types included but not limited to the following:
 - a. Split-face
 - b. Split-face center score
 - c. Smooth-cast
 - d. Split Rib
 - e. Or as indicated on the drawings.
- C. Size: Manufacturer's standard units with nominal face dimensions of 16" or 18" long x 8" high x 4" thick (15-5/8" or 17-5/8" x 7-5/8" x 3-5/8" actual).
- D. Type I, moisture-controlled units.
- E. Exposed Faces: Manufacturer's standard color and texture as selected by Architect unless otherwise indicated.
 1. Where special finishes are indicated, provide units with exposed faces of the following general description matching color and texture of Architect's samples.
 2. Where special patterns are indicated, provide units with exposed faces matching color, texture, and pattern of Architect's samples.

2.05 BRICK MADE FROM CLAY OR SHALE:

- A. General: Comply with referenced standards and other requirements indicated below applicable to each form of brick required.
 1. Size: Provide bricks manufactured to the following actual dimensions:

- a. Standard Modular: 2-1/4" x 3-5/8" x 7-5/8".
 - b. Or as indicated on the drawings.
- 2. Provide special molded shapes where indicated and for application requiring brick of form, size, and finish on exposed surfaces which cannot be produced from standard brick sizes by sawing.
 - 3. For sills, caps, and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncured or unfroged units with all exposed surfaces finished.
- B. Facing Brick: ASTM C 216, and as follows:
- 1. Grade SW.
 - 2. Type FBS (normal size and color variations).
 - 3. Compressive Strength: 4,500 psi, minimum, per ASTM C 67.
 - 4. Application: Use where brick is exposed, unless otherwise indicated.
 - 5. Texture and Color: As indicated on drawings or as selected by Architect.
- C. Building (Common Brick): ASTM C 62, and as follows:
- 1. Grade MW except Grade SW where indicated by ASTM C 62 grade requirements for applicable weathering index and exposure.
 - 2. Application: Use where brick is indicated for concealed locations.

2.06 FIRE BRICK MASONRY:

- A. General: Comply with referenced standards and other requirements indicated below applicable to each form.
- B. Fire Brick: Provide units complying with characteristics indicated below for classification, P.C.E. rating, chemical percentage analysis, modulus of rupture, cold crushing P.S.I., porosity % and bulk density.
- 1. Classification: ASTM C-27-98 (2013), medium duty.
 - 2. P.C.E.: Cone 29 3018 F.
 - 3. Chemical Analysis:
 - a. Silica: 59.90
 - b. Alumina: 32.83
 - c. Iron Oxide: 1.97
 - d. Titanium Oxide: 1.48
 - e. Calcium Oxide: .57
 - f. Magnesium Oxide: .89
 - g. Sodium Oxide: .49
 - h. Potassium Oxide: 1.80
 - 4. Modulus of Rupture: 1000-1200 PSI
 - 5. Cold Crushing: 3500-4500 PSI
 - 6. Apparent Porosity: 16-19%
 - 7. Bulk Density: 130-134 lbs/ft
 - 8. Method of Manufacturer: Dry Press

2.07 MORTAR AND GROUT MATERIALS:

- A. General: Do not use admixtures, including coloring pigments, air entraining agents, accelerators, retarders, water repellant agents, anti-freeze compounds, or other admixtures unless otherwise indicated and approved by Architect.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Limit cementitious materials in mortar to portland cement and lime.
 - 3. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
 - 4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 - 5. All new face brick mortars shall match existing face brick mortars where restoration work is required, samples of which shall be prepared and thoroughly tested for color, density, and uniformity before submitting samples for the approval of the Architect.
- B. Option 1 - Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to project site.
- C. Option 2 - Manual Blend: Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.
- D. Mortar for Unit Masonry: Comply with ASTM C 270, "Standard Specification for Mortar for Unit", Masonry Proportion Specification, for types of mortar required unless otherwise indicated.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced CMU masonry, use Type S.
 - 3. For brick masonry walls above grade, use Type N.
 - 4. For exterior, above-grade, load-bearing and non-load-bearing CMU walls and parapet walls; for interior load-bearing CMU walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.
 - 5. Analysis of the existing mortar to remain is required within the contract if the type required is not clear.
- E. Portland Cement: ASTM C 150, "Standard Specification for Portland Cement", Type I, except Type III, may be used for cold weather construction. Provide natural color or white cement as required to produce required mortar color.
 - 1. For colored pigmented mortars, use premixed colored masonry cements of formulation required to produce color indicated, or, if not indicated, as selected from manufacturer's standard formulations by

Architect.

2. Available Products: Subject to compliance with requirements, masonry cements which may be incorporated in the work include, but are not limited to, the following:
 - a. **"Atlas Custom Color Masonry Cement"**; Lehigh Portland Cement Company.
 - b. **"Glen-Gery Color Martar Blend"**; Glen -Gery Corporation.
 - c. **"Flamingo Color Masonry Cement"**; The Riverton Corporation.
- F. For Manually Blended Colored Mortar Use Colored Mortar Pigments (for use with veneer brick and veneer block): Use pigments complying with ASTM C979, "Standard Specification for Pigments for Integrally Colored Concrete". Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment to cement ratio of 1 to 10 by weight. Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.
 1. Available Products: Subject to compliance with requirements, colored mortar pigments which may be incorporated in the work include, but are not limited to, the following:
 - a. **"SGS Mortar Colors"**, Solomon Grind-Chem Services, Inc.
 - b. **"True Tone Mortar Colors"**; Davis Colors, a subsidiary of Rockwood Industries, Inc.
 - c. **"Bayferrox Iron Oxide Pigments"**; Bayer Corporation, Industrial Chemical Division.
- G. Water: Clean and potable.
- H. Hydrated Lime: ASTM C 207, "Standard Specification for Hydrated Lime for Masonry Purposes", Type S.
- I. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
- J. Aggregate for Mortar: ASTM C 144, "Standard Specification for Aggregates for Masonry Mortar".
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than $\frac{1}{4}$ inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
- K. Aggregate for Grout: ASTM C 404, "Standard Specification for Aggregates for Masonry Grout".

- L. Grout for Unit Masonry: Comply with ASTM C 476, "Standard Specification for Grout for Masonry", for grout for use in construction of reinforced and non-reinforced unit masonry. (Refer to Table 1 Conventional Grout Proportions by Volume. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout. Comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

TABLE 1 Conventional Grout Proportions by Volume

Type	Parts by Volume of Portland Cement or Blended Cement	Parts by Volume of Hydrated Lime or Lime Putty	Aggregate, Measured in a Damp, Loose Condition	
			Fine	Coarse
Fine grout	1	0-1/10	2-1/4 -3 times the sum of the volumes of the cementitious materials	...
Coarse grout	1	0-1/10	2-1/4 -3 times the sum of the volumes of the cementitious materials	1-2 times the sum of the volumes of the cementitious materials

1. Use fine grout in grout spaces less than 2" in horizontal direction unless otherwise indicated.
2. Use coarse grout in grout spaces 2" or more in least horizontal dimension unless otherwise indicated.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.
4. The compressive strength of the grout shall match the compressive strength of the masonry f'm, but not less than 2,000 psi. The compressive strength of grout so specified should be determined according to ASTM C1019 (UBC 21-18).

- M. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Available Products:

- a. Addiment Incorporated: **Mortar Kick.**
- b. Euclid Chemical Compnay; **Accelguard 80.**
- c. Grace Construction Products, a unit of W.R. Grace & Co., **Morset.**
- d. Sonneborn, division of ChemRex; **Trimix-NCA.**

2.08 FIRE WALLS:

- A. General: Comply with the referenced standards and other requirements indicated below as applicable to each type of fire wall construction required.

- B. Provide masonry units and construction as required by Underwriter's Laboratories, Inc.; Design as indicated on the Contract Drawings.
 - 1. If no specific designs are represented on the drawings, the following designs shall be utilized:
 - a. 3-Hour Firewall - UL Design No. U904.
 - b. 2-Hour Firewall - UL Design No. U905 or UL Design No. U906.
- C. Provide complete fire wall assembly submittals independent of typical masonry submittals.
 - 1. Only eligible manufacturers with products bearing the UL mark will be accepted for use in the construction of fire walls.

2.09 JOINT REINFORCEMENT, TIES, AND ANCHORING DEVICES:

- A. Materials: Comply with requirements indicated below for basic materials and with requirements indicated under each form of joint reinforcement, tie, and anchor for size and other characteristics.
 - 1. Zinc-Coated (mill galvanized) Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 641 for zinc coating of class indicated below:
 - a. Class 1: 0.40 oz. per square foot of wire surface.
 - b. Application: Use for masonry not exposed to exterior or earth.
 - 2. Hot-Dip Galvanized Steel Wire: ASTM A 82 for uncoated wire and with ASTM A 153 for zinc coating applied after prefabrication into units.
 - a. Class B-2: 1.5 oz. per square foot of wire surface.
 - b. Application: Use for all masonry back-up exposed to exterior.
 - 3. Uncoated Steel Reinforcing Bars: Of size and locations as indicated on drawings, ASTM A615, Grade 60, deformed.
 - 4. Stainless Steel Reinforcing Bars: AISI Type 304, ASTM A580, for historical masonry reconstruction projects.
- B. Joint Reinforcement: Reinforcement to conform to Standard Specification ASTM A951 & ACI/ASCE 530 (Building Code Requirements for Masonry Structures). Provide welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet with prefabricated corner and tee units, and complying with requirements indicated below:
 - 1. Width: Fabricate joint reinforcement in units with widths of approximately 2" less than nominal width of walls and partitions as required to provide mortar coverage of not less than 5/8" on joint faces exposed to exterior and 1/2" elsewhere.
 - 2. Wire (Carbon Steel): Pre-fabricated construction from cold-drawn steel wire conforming to ASTM A 82:

Tensile Strength: 80,000 psi.

Yield Point: 70,000 psi, minimum.

3. Wire Diameter for Cross & Side Rods: Provide standard weight 9 gauge (.148"), typical.
- C. Single-Wythe Masonry: Provide type as follows with single pair of side rods:
- a. Provide Hohmann & Barnard, Inc. **#220 Ladder Mesh Reinforcement** - Ladder design with perpendicular cross rods spaced not more than 16" o.c.
 - b. Finish: Provide mill galvanized, per ASTM A 641.
- D. Multi-Wythe Masonry: Provide type as follows:
- a. Provide Hohmann & Barnard, Inc. **#120 Ladder Mesh Reinforcement** - Ladder design with perpendicular cross rods spaced not more than 16" o.c.
 - b. Finish: Provide mill galvanized, per ASTM A 641.
- E. Masonry Joint Reinforcement for Cavity-Wall Masonry:
- a. Provide Hohmann & Barnard, Inc. **# 270-ML Ladder Adjustable Eye-Wire Reinforcement** - Ladder design with perpendicular cross rods spaced not more than 16" o.c., Cross rods to be welded at 16" o.c; first cross rods to be welded 12" in from each end to allow for lap splices.
 - b. Finish: Provide hot-dip galvanized, after fabrication, per ASTM A 153.
- F. Steel Stud Masonry Anchor System: (Where required) Provide **X-Seal Anchor System with Byna-Lock Wire Ties**, as manufactured by *Hohmann & Barnard, Inc.*, 30 Rasons Court, Hauppauge, New York, 11788; tel (800) 645-0616; fax (631) 234-0683. website: www.h-b.com.
- G. Reinforce each course of block cut back for fire extinguisher cabinets, electrical boxes and toilet accessory type recessed items. Mortar 9 gauge reinforcing wire in joints, that is 24-inches longer than recessed opening width on both sides.
- H. All steel reinforcement to contain minimum 90 percent combined post-consumer and post-industrial recycled content. (Required for LEED Projects only)

2.10 TIES AND ANCHORS

- A. Materials: Provide ties, reinforcing and anchors, specified in subsequent articles, made from materials that comply with this article, unless otherwise indicated.
1. Carbon Steel Wire: ASTM A 82.
 2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
 3. Products meeting specified products quantities by Hohmann &

Barnard, Inc. or Heckmann Building Products Inc.

4. Anchors and ties shall be 16 inches on center each way.
5. Horizontal reinforcing shall be 16 inches on center.

- B. Joint Stabilizing Anchors: Provide Hohmann & Barnard, Inc., **Slip-Set™ Stabilizer** joint stabilizing anchors at veneer control joints and block interior wall, running wall, corner, "Tee", and "Ell" joints.
1. Provide joint stabilizing anchors at connection of new masonry to existing masonry or concrete walls.
 2. Refer to Structural Drawings for additional requirements.
- C. Rigid Anchors: Provide Hohmann & Barnard, Inc., **#344 - Rigid Partition Anchor**, Z-Type bent steel shape 1-1/2 inches wide by 1/4 inch thick by 24 inches long or length required, with ends turned up 2 inches or with cross pins. (Rigid anchors can be used to connect T-intersections of CMU shear walls in lieu of masonry bonding or bond beams. (Used at T-intersections of other CMU walls and piers where indicated on drawings, although masonry bonding and T-shaped masonry joint reinforcement may be used.)
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M. (Rigid anchors may not be fully embedded in mortar or grout and, therefore, require a coating for corrosion protection.)
- D. Mesh Wall Ties: Provide Hohmann & Barnard, Inc., **MWT - Mesh Wall Tie**, 1/2" square x 16-gauge, by width & length required; hot dip galvanized to ASTM A153 B2 finish.
- E. Corrugated Wall Ties: Provide Hohmann & Barnard, Inc., **CWT - Corrugated Wall Tie**, 7" long x 16-gauge, or length as required; hot dip galvanized to ASTM A153 B2 finish.
- F. Beam Strap Anchors: Provide Hohmann & Barnard, Inc., **#364 Corrugated Gripstay Anchor** 1-1/4 inch x 14 gauge, by length required; hot dip galvanized to ASTM A153 B2 finish.
- G. Breakaway Fire Wall Anchors: Provide Heckmann Building Products, **#134 Channel Slot Corrugated Anchor** for masonry to structural steel beams and **#196 Corrugated Notch Column Anchor** for masonry to structural steel columns, 1-1/4 inch x 16 gauge, by length required; Zinc Alloy 710.
- H. Masonry Column Anchors: Provide Hohmann & Barnard, Inc., **#353L - Column Anchor**, 1-1/4 inch x 12 gauge, by length required; hot dip galvanized to ASTM A153 B2 finish or Hohmann & Barnard, Inc., **#354 - Notched Column Anchor (Corrugated Type)**, 1-1/2 inch x 12 gauge, by length required; hot dip galvanized to ASTM A153 B2 finish.
- I. Partition Top Anchors: Provide Hohmann & Barnard, Inc., **PTA Series Anchors - PTA 422**, 12-gauge steel plate; hot dip galvanized to ASTM A153 B2 finish.

J. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
 - a. Provide Hohmann & Barnard, Inc., **HB-200/DA-213 Adjustable Veneer Anchor**, with two stainless steel fasteners #12 diameter each.

2.11 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of dimensions indicated.
- B. Wedge Anchors: Anchors shall meet the physical requirements of Federal Specification A-A-1923A, Type 4. Anchors shall be non-bottom bearing type with a single piece steel expansion clip providing 360-degree contact with the base material and shall not require oversized holes for installation. Carbon steel anchors shall have an electroplated zinc finish or shall be mechanically galvanized in accordance with ASTM B695, Class 55, Type 1, as appropriate. Stainless steel anchors shall be type 303, 304 or 316. Anchors shall have an evaluation report issued by ICC-ES and have been tested in accordance with ICC-ES AC01 for all mandatory tests and including the following:
1. Seismic tension & shear
 2. Combination of tension and shear loads
 3. Critical and minimum edge distance

Unless otherwise noted, wedge anchors shall be **"Wedge-All" Wedge Anchors** by Simpson Strong-Tie (ICC-ES ESR-1396).

- C. Sleeve Anchors: Anchors shall meet the physical requirements of Federal Specification A-A-1922A. Anchors shall be non-bottom bearing type with a single piece steel expansion sleeve providing 360-degree contact with the base material and shall not require oversized holes for installation. Carbon steel anchors shall have an electroplated zinc finish. Stainless steel anchors shall be type 304. Anchors shall have been tested in accordance with ICC-ES AC01 for the following:
- D.
1. Static Loads
 2. Critical and minimum edge distance and spacing

Unless otherwise noted, sleeve anchors shall be **"Sleeve-All" Sleeve Anchors** by Simpson Strong-Tie.

- E. Postinstalled Veneer Anchors For Reconstruction Work: Provide

chemical anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

2.12 CONCEALED FLASHING MATERIALS:

B. Thru Wall Flashing Membrane (where so noted on the drawings):

1. Through-wall Flashing Membrane (Self-Adhering) shall be **Blueskin® TWF**, an SBS modified bitumen, self-adhering sheet membrane complete with a yellow engineered thermoplastic film; as manufactured by Henry Company, 909 North Sepulveda Blvd. Suite 650, El Segundo, CA, 90245; tel. (800) 598-7663; email: techservices@henry.com. Provide pre-fabricated inside & outside corners and end dams mitered and fully adhered, including **Stainless Steel 3" Drip Plate** and all required bonding accessories as standard to Base Bid. Provide pre-formed drip plate inside and outside corners with smooth uninterrupted hemmed drip edge.

Membrane shall have the following physical properties:

- a. Membrane Thickness: 0.0394 inches (40 mils),
- b. Film Thickness: 4.0 mils,
- c. Flow (ASTM D5147): Pass @ 212 degrees F,
- d. Puncture Resistance: 134 lbf to ASTM E 154,
- e. Tensile Strength (film): 5000 psi minimum ASTM D 882,
- f. Tear Resistance: 45lbs.-MD, 17lbs.-CD to ASTM D1004,
- g. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M

C. Sheet Metal Counter Flashing (where so noted on the drawings): Fabricated from the following metal complying with requirements specified in Division 7 Section "Flashing and Sheet Metal" and below:

1. Copper: 7 oz. weight copper fabric flashing as manufactured by York for fully concealed flashing, and 16 oz. weight copper for cap flashing. Provide copper flashing where sloped glazing occurs.
2. At parapet cap stones use 16 oz. copper dove-tail flashing manufactured by Cheney Flashing Company.
3. Fabricate through-wall metal flashings with deformation in both directions for integral mechanical mortar bond.
4. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Flashing and Sheet Metal".

2.13 TRANSITION MEMBRANES: (where so noted on the drawings)

- A. Primary sheet air/vapor barrier membrane shall be **Blueskin® SA**, an SBS modified bitumen, self-adhering sheet membrane complete with a blue engineered thermoplastic film; as manufactured by Henry

Company, 909 North Sepulveda Blvd. Suite 650, El Segundo, CA, 90245; tel. (800) 598-7663; email: techservices@henry.com.

- B. Primer: Primer for self-adhering membranes at temperatures above 25°F shall be Aquatac™ Primer manufactured by Henry, a polymer emulsion based adhesive, quick setting, having the following physical properties:
1. Color: Aqua.
 2. Weight: 8.7 lbs/gal.
 3. Solids by weight: 53%.
 4. Water based, no solvent odors.
 5. Drying time (initial set): 30 minutes at 50% RH and 70°F.

2.14 MISCELLANEOUS MASONRY ACCESSORIES:

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control Joint Strips: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Control Joint Block Shear Connector: Provide sash block either side of control joint and insert Hohmann & Barnard, Inc. **RS Series - Rubber Control Joint** in joint full height.
- E. Control Joint Foam (Mortar Excluding) Filler: Provide Hohmann & Barnard, Inc., **NS - Closed Cell Neoprene Sponge** expansion joint in veneer control joints held back for bond breaker and sealant. Apply sealant at cavity face of block prior to applying vapor barrier to make building airtight.
1. Compressible Control Joint Foam Filler: Provide Hohmann & Barnard, Inc., **NS - Closed Cell Neoprene Sponge** with adhesive backing under shelf angles to allow for vertical veneer movement. Hold back for sealant and bond breaker.
- F. Weepholes: Provide the following for weepholes:
1. Full Head Joint Weep Holes: Provide a full height open cell weep hole at base of wall above flashing and above steel lintels provided with thru-wall flashing.
 2. Weep Vents (Top of Wall): Available Products; subject to compliance with requirements, weephole/ventilators which shall be incorporated in the work include, but are not limited to, the following:
 - a. "Hohmann and Barnard" No. 343, No. 343W Louvered Weep Hole. For use with Standard white and grey mortar.
 - b. "Hohmann and Barnard" No. QV-Quadrovent. For use with colored

mortars. Color as selected by Architect.

- G. Cavity Drainage Material: Free-draining mesh, made from high density polyethylene strands (1" x 10" x 60") that will not degrade within the wall cavity; 90% open mesh weave.

1. Provide the following configuration:

- a. Strips, full-depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.

2. Products:

- a. Mortar Net USA, Ltd.; "Mortar Net"
b. Hohmann and Barnard; "Mortar Trap"

- H. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

1. Available Products:

- a. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
c. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.15 INSULATION:

- A. Cavity wall closed cell expanded polystyrene insulation as indicated on drawings and specified in related sections. Refer to Specification Section 07219. Thickness as indicated on drawings.

1. Cavity wall assembly will utilize continuous rigid board cavity insulation adhered to CMU with all joints and penetrations sealed with spray foam sealant.

2.16 MASONRY CLEANERS:

- A. Acidic Cleaner: Manufacturer's standard strength general purpose cleaner designed for new masonry surfaces of type indicated; composed of blended organic and inorganic acids combined with special wetting systems and inhibitors; expressly approved for intended use by manufacturer of masonry units being cleaned.

1. Available Products: Subject to compliance with requirements, a product which may be used to clean unit masonry surfaces includes, but is not limited to, the following:

- a. "Sure Klean" No. 600 Detergent; ProSoCo, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Contractor shall examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Prepare written report, endorsed by Installer, listing any conditions requiring correction prior to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Commencement of installation indicates acceptance of conditions preovied.

3.02 INSTALLATION, GENERAL:

- A. Do not wet concrete masonry units.
- B. Cleaning Reinforcing: Before placing, remove loose rust, ice, and other coatings from reinforcing.
- C. Thickness: Build cavity and composite walls, and other masonry construction to the full thickness shown. Build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness indicated.
 - 1. Build chases and recesses as shown or required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.
 - 2. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.
 - 3. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining work. Use full-size units without cutting where possible.
- D. Matching Existing Masonry Work: Match coursing, bonding, color, and texture of new masonry work with existing work unless otherwise indicated or if there is a unit size different or joint thickness variation. Tooth-in new masonry when tying into existing unless otherwise indicated on the drawings.
- D. Tuck Pointing: Mortar shall be pre-hydrated. The specified ingredients shall be mixed with only enough water to produce a damp mass of such consistency that it will retain its form when pressed

into a ball by the hands but will not flow under the trowel; then allowed to stand for not less than 1 hour nor more than 2 hours and remixed at once with the addition of enough water to produce satisfactory workability for immediate use. Tuck pointing is intended for use in repair work.

- F. Select and arrange units for exposed brick unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed unless otherwise specifically indicated on documents.

3.03 CONSTRUCTION TOLERANCES:

- A. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
- B. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arises, do not exceed 1/4" in 10", or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, or 1/2" in 40' or more. For vertical alignment of head joints, do not exceed plus or minus 1/4" in 10', 1/2" maximum.
- C. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls, do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".
- E. Variation In Mortar Joint Thickness:
 - 1. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
 - 2. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
- F. Variation In Face Dimensions: For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
- G. Variation In Alignment: For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.04 LAYING MASONRY WALLS:

- A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to accurately locate openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half size units at corners, jambs, and, wherever possible, at other locations.
- B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other work.
- C. Pattern Bond: Lay exposed masonry in the bond pattern shown, or, if not shown, lay in running bond with vertical joint in each course centered on units in courses above and below. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4" horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back ½-unit length in each course; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.
 - 1. Fill space between hollow metal frames and masonry solidly with mortar unless otherwise indicated.
 - 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
 - 3. Fill cores in hollow concrete masonry units with grout 3 courses (24") under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- F. Build non-load-bearing interior partitions full height of story to within 1" of underside of solid floor or roof structure above, unless otherwise indicated. Coordinate this work with all required firestopping requirements.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.
 - 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 7 Section "Fire-Resistive Joint Systems."
- G. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes.

1. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.
2. If construction sequence does not allow simultaneous construction of intersecting or abutting walls, provide mesh wall ties @ 16" o.c. vertical install in initial wall and leave hanging out for incorporation into secondary wall.

3.05 MORTAR BEDDING AND JOINTING:

- A. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and place units. Do not slush head joints.
- B. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- D. Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not shown, lay walls with 3/8" joints.
- E. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials, unless otherwise indicated.
- F. Interior Exposure Joints: Provide concave joints horizontal and vertical.
- G. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners or jambs to shift adjacent stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

3.06 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY:

- A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes. Install at not more than 16" o.c. vertically.
- B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.
 1. For horizontally reinforced masonry, provide continuity at corners with prefabricated "L" units, in addition to masonry bonding.
- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes.
 1. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.

2. If construction sequence does not allow simultaneous construction of intersecting or abutting walls, provide mesh wall ties @ 16" o.c. vertical install in initial wall and leave hanging out for incorporation into secondary wall.

3.07 COMPOSITE MASONRY:

- A. Bond wythes of composite masonry together using one of the following methods:
 1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
 - a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
 2. Masonry Joint Reinforcement: Installed in horizontal joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
 - b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
- B. Bond adjacent wythes of composite masonry together using full collar joints.
- C. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
- D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.
 1. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.
- E. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 1. Provide individual metal ties not more than 16 inches o.c.
 2. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.
 3. Provide rigid metal anchors not more than 24 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.
 4. If construction sequence does not allow simultaneous construction of intersecting or abutting walls, provide mesh wall ties @ 16" o.c. vertical install in initial wall and leave hanging out for incorporation into secondary wall.

3.08 CAVITY WALLS:

- A. Tie wythes of cavity walls together using one of the following methods:
 - 1. Ladder Type Pintel & Eye Joint Reinforcement: Installed in horizontal mortar joints where bed joints of both wythes align, use adjustable (two piece) ladder-type reinforcement on back-up masonry with pintel & eye extending across cavity securing veneer.
 - 2. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
 - a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
 - 3. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.
- B. Attempting to remove mortar fins from cavity or to trowel them flat against brick usually results in increased mortar droppings at base of cavity; keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavity flush. Bevel beds away from cavity, to minimize mortar protrusions into cavity.
- C. Provide weepholes (full head open cell joints) in exterior wythe of cavity wall located immediately above ledges and flashing, spaced 24" o.c., unless otherwise indicated.
- D. Provide weep vents in exterior wythe of cavity wall located at top of cavity walls at 24" o.c., unless otherwise indicated.

3.09 CAVITY WALL INSULATION:

- A. Cavity insulation shall be installed continuously between lines of horizontal joint reinforcement butting edges flush. Adhere to back-up block and seal all joints with adhesive/sealer compatible with insulation, product as recommended by the insulation manufacturer.
- B. Refer to Division 7 Section 07219 "Building Insulation" & Section 07231 "Air/Vapor Barrier System" for installation requirements applicable to continuous rigid insulation.
- C. Provide insulation thickness as indicated on drawings.

3.10 HORIZONTAL JOINT REINFORCEMENT:

- A. General: Provide continuous horizontal joint reinforcements as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8" on exterior side of

walls, 1/2" elsewhere. Lap reinforcing a minimum of 6".

- B. Cut or interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
 - C. Reinforce walls with continuous horizontal joint reinforcing unless specifically noted to be omitted.
 - D. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections.
 - E. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- 1. Space continuous horizontal reinforcement as follows:
 - a. For multi-wythe walls (solid or cavity) where continuous horizontal reinforcement acts as structural bond or tie between wythes, space reinforcement as required by code but not more than 16" o.c. vertically.
 - b. For foundation and parapet walls, space reinforcement at 8" o.c. vertically unless otherwise indicated.
 - 2. Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcement placed in 2 horizontal joints approximately 8" apart, immediately above the lintel and immediately below the sill. Extend reinforcement a minimum of 2'-0" beyond jambs of the opening except at control joints.
 - a. In addition to wall reinforcement, provide additional reinforcement at openings as required to comply with the above.

3.11 CONTROL AND EXPANSION JOINTS:

- A. General: Provide vertical and horizontal expansion, control, and isolation joints in masonry where shown. Build-in related items as the masonry work progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- 1. Build-in horizontal pressure relieving joints where indicated; construct joints by either leaving an air space or inserting non-metallic compressible joint filler of width required to permit installation of sealant and backer rod.
 - a. Locate horizontal pressure relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.
 - 5. Build in vertical pressure relieving joints. Expansion joints shall be located in sizes and locations as shown on drawings.
 - 6. Vertical control joints: unless otherwise noted, control joints shall be located as shown on drawings and/or in accordance with the ACI guidelines and specified herein. Location of all control joints shall be reviewed by Architect prior to proceeding with work.
 - a. Vertical interior and exterior masonry control joints shall be 1/2" wide and filled with appropriate caulk.

b. Control joint spacing for exterior and interior walls:

<u>Wall Height (FT)</u>	<u>Horizontal Joint reinforcing 16" O.C.</u>
Up to 8 feet	25 ft O.C.
8ft to 12 ft	30 ft. O.C.
Over 12 ft.	35 ft. O.C.

c. Control joints for interior and exterior masonry shall be located at the following points of weakness or high stress concentrations:

1. At all abrupt changes in wall height.
2. At all changes in wall thickness, such as those at pipe or duct chases and those adjacent to columns or pilasters.
3. Above joints in foundations and floors.
4. Below joints in roof and floors that bear on the wall.
5. At a distance of not over one-half the allowable joint spacing from bonded intersections or corners.
6. At one or both sides of all door and window opening unless other crack control measures as used, such as joint reinforcement or bond beams.

B. Control joints in 2 hour fire rated CMU walls shall be as follows: Joint size maximum $\frac{1}{2}$ " with nominal $\frac{3}{4}$ " diameter polyethylene backer rod compressed and installed into joint with minimum of $\frac{1}{4}$ " thick fill materials applied within the joint flush with both surfaces of the wall as manufactured by "3M Company" - model # FD-150+. Note: All installations shall be in accordance with UL guidelines for joint systems.

3.12 ANCHORING MASONRY TO STRUCTURAL MEMBERS:

A. Anchor masonry to structural members as detailed and indicated within the Construction Documents or where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.
4. Coordinate anchors with flashing and air/vapor barrier requirements. Seal any penetrations necessary in flashing and air/vapor barriers.

B. Firewalls: Provide melt-away anchors at all firewalls to anchor

masonry to structural members as detailed and indicated within the Construction Documents when required for structural bracing.

3.13 LINTELS:

- A. Install steel lintels of size and configuration shown where indicated in Construction Documents. Provide galvanized steel lintels at all exterior conditions where exposure to moisture is possible.
- B. Provide minimum bearing of 6" at each jamb unless otherwise indicated.

3.14 FLASHING OF MASONRY WORK:

- A. Refer to Division 7 Section 07231 "Air/Vapor Barrier System" for installation requirements applicable to through wall flashing.
- B. General: Provide concealed self-adhering through wall flashing in masonry work continuous at base of wall at or above shelf angles, lintels, ledges, and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior.
 - 1. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Seal penetrations in flashing with mastic before covering with mortar.
 - 2. Place horizontal leg of through wall flashing on sloping bed of mortar and cover with mortar. Set stainless steel drip plate into minimum of ¼" bead of water block sealant, apply spray primer and allow to dry 4 to 5 minutes; within 30 minutes of setting primer set self-adhering through wall flashing onto drip plate set back from face of exterior face of masonry.
 - 3. Extend flashing the full length of lintels and shelf angles and minimum of 4" into masonry each end then provide end dams at lintels and sills. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up typically two full cmu back-up courses (16") but a minimum of 4" where restricted, and through the inner wythe to within 1/2" of the interior face of the wall in exposed work. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2". At heads and sills turn up ends not less than 2" to form a pan.
 - 4. Install flashing to comply with manufacturer's instructions.
 - 5. Provide fully open cell weep hole head joints of the first course of masonry immediately above concealed flashings. Space 24" o.c. unless otherwise indicated.
 - 6. Install reglets and nailers for flashing and other related work where shown to be built into masonry work.
 - 7. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Cavity Drainage Material" Article.
 - 8. Install vents in head joints at top course of just below or where indicated in exterior wythes at spacing indicated or 24" o.c. Use specified weep/vent products to form vents.

- a. Close cavities off vertically and horizontally with treated wood blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.15 INSTALLATION OF REINFORCED UNIT MASONRY:

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602. Place reinforcement of size and type and spacing as indicated in structural drawings.
- C. Grouting: Grout reinforced cores full height in coordination with and as indicated on structural drawings. Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Limit height of vertical grout pours to not more than 60 inches.
 3. The use of mortar to fill the cells is not permissible.

3.16 INSTALLATION OF SELF-ADHERING TRANSITION MEMBRANES:

- A. Refer to Division 7 Section 07231 "Air/Vapor Barrier System" for installation requirements applicable to self-adhering transition membranes.
- B. General: Provide self-adhering transition membranes locations including window & door openings, top of wall covering wood blocking tied into roofing, changes in materials, across expansion joints, around penetrations, structural steel exposed within the cavity and wherever indicated on the construction documents.
 1. Coordinate installation of transition membranes with other materials utilized as part of the air/vapor barrier system utilizing compatible products.
 2. Install transition membranes to comply with manufacturer's instructions.

3.17 REPAIR, POINTING, AND CLEANING:

- A. Remove and replace masonry units which 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 the tooling of joints, enlarge any voids or holes, except weepholes, and completely fill with mortar. Point up all joints including corners, openings, and adjacent work to provide a neat, uniform appearance, prepared for application of sealants.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly sets and cured, clean masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of installed masonry.
 - 3. Fully clean installation of exterior masonry with specified cleaner; apply and rinse, remove in accordance with manufacturer instructions.
 - 4. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 5. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 6. Use bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" to clean brick masonry made from clay or shale, except use masonry cleaner as indicated in Part 2 "Masonry Cleaners" Article.
 - 7. Clean exterior finished concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.
- E. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion. Protect waterproofing membrane and drain board work from other trades during construction. Backfill with specified materials, protect membrane from damage.

3.18 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, recycle or remove all surplus materials from the Project site(s).

END OF SECTION

DIVISION 5 - METALS

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 SUMMARY

- A. Extent of structural steel work is shown on drawings, including schedules, notes, and details to show size and location of members, typical connections, and type of steel required.
- B. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
- C. Miscellaneous metal fabrications are specified elsewhere in Division 5. Refer to Division 3 for anchor bolt installation in concrete; Division 4 for masonry.
- D. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and test will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 - 1. Promptly remove and replace materials or fabricated components which do not comply.
- E. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work. Contractor shall retain the services of a licensed professional engineer for the design of any connections not shown on the drawings.
 - 1. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

1.03 SUBMISSIONS

- A. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 - 1. Structural steel (each type), including certified copies of mill

reports covering chemical and physical properties.

2. High-strength bolts (each type), including nuts and washers.
 3. Structural steel primer paint.
 4. Shrink-resistant grout.
- B. Shop Drawings: Submit shop drawings prepared under the supervision of a registered professional engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols, and show size, length, and type of each weld.
 2. Provide setting drawings, templates, and directions, for installation of anchor bolts and other anchorages to be installed as work of other sections.
- C. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of tests conducted and test results.
- D. Surveys: Submit certified copies of each survey conducted by a registered professional engineer or land surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel, and final elevations and locations for major members. Indicate discrepancies between actual installation and contract documents.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
1. AISC 'Code of Standard Practice for Steel Buildings and Bridges.'
 2. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence: "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings."
 3. AISC "Specifications for the Design, Fabrications, and Erection of Structural Steel for Buildings," including "Commentary" and Supplements thereto as issued.
 4. AISC "Specifications for Architecturally Exposed Structural Steel."
 5. AISC "Specifications for Structural Joints using ASTM A325 or A490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.

6. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
7. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."

B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

2. If recertification of welders is required, retesting will be Contractor's responsibility.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion or deterioration.

1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Metal Surfaces, General: For fabrications of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes.

B. Structural Steel Shapes, Plates, and Bars: ASTM A992/A572-50.

C. Cold-Formed Steel Tubing: ASTM A500, Grade B.

D. Hot-Formed Steel Tubing: ASTM A501.

E. Steel Pipe: ASTM A53, Type E or S, Grade B; or ASTM A501.

1. Finish: Black, except where indicated to be galvanized.

F. Steel Castings: ASTM A27, Grade 65-35, medium-strength carbon steel.

G. Headed Stud-Type Shear Connectors: ASTM A108, Grade 1015 or 1020, cold finished carbon steel; with dimensions complying with AISC Specifications.

H. Anchor Bolts: ASTM A307, non-headed type unless otherwise indicated.

- I. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low-carbon steel bolts and nuts.
 - 1. Provide either hexagonal or square, head and nuts, except use only hexagonal units for exposed connections.
- J. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A325.
 - 2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A490.
 - a. Direct tension indicator washers may be used at Contractor's option.
- K. Electrodes for Welding: Comply with AWS Code.
- L. Structural Steel Primer Paint: 10-1009 Gray Metal Primer by Tnemec Co., Inc.
- M. Loose and Hung Lintel Steel Primer Paint: 50-330 Poly-Ura-Prime by Tnemec Co., Inc.
 - 1. Lintel angles for exterior veneer, either loose or hung, shall be hot dip galvanized. Final painting shall be after installation, but prior to installation of items in masonry openings.
- N. Non-metallic Shrinkage-resistant Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CE-CRD-C621.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. Euco N.S.; Euclid Chemical Company.
 - b. Crystex; L & M Construction Chemicals.
 - c. Masterflow 713; Master Builders.
 - d. Five Star Grout; U.S. Grout Corporation.
 - e. Upcon; Upco Chemical Division, USM Corporation.
 - f. Propak; Protex Industries, Inc.
 - g. Set Non-Shrink; Set Products, Inc.

2.02 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.
1. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
 2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.
- C. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 or A490 Bolts".
- D. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
- E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Shop weld shear connectors, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.
- F. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.
1. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
 2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
- G. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints as indicated on drawings.

2.03 SHOP PAINTING

- A. General: Shop paint structural steel, except those members or

portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.

1. Do not paint surfaces which are to be welded or high-strength bolted with friction-type connections.
 2. Do not paint surfaces which are scheduled to receive sprayed-on fireproofing.
 3. Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with one of the approved Steel Structures Painting Council (SSPC) methods as follows:
1. SP-1 "Solvent Cleaning."
 2. SP-2 "Hand Tool Cleaning."
 3. SP-3 "Power Tool Cleaning."
 4. SP-5 "White Metal Blast Cleaning."
 5. SP-6 "Commercial Blast Cleaning."
 6. SP-7 "Brush-Off Blast Cleaning."
 7. SP-10 "Near-White Blast Cleaning."
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting Paint System Guide No. 7.00.
- D. Painting: Provide a one-coat shop applied paint system complying with Steel Structures Painting Council (SSPC), methods which result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 - EXECUTION

3.01 ERECTION

- A. Surveys: Employ a registered professional engineer or land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made, or until compensating adjustments to

structural steel work have been agreed upon with Architect.

- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.
- D. Setting Bases and Bearing Plates: Clean concrete and masonry surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
 - 1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 - a. 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 base or bearing plate prior to packing with grout.
 - b. Pack grout solidly between bearing surfaces and base or bearing plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - c. For proprietary grout materials, comply with manufacturer's instructions.
- E. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure within specified AISC tolerances.
 - 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 time of erection and mean temperature at which structure will be when completed and in service.
 - 3. Splice members only where indicated and accepted on shop drawings.
- F. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - a. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- G. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
- H. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.
- I. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint on structural steel is included in Division 9 under painting work.

3.02 QUALITY CONTROL:

- A. The Contractor shall make arrangement for and the Owner shall pay for an independent testing and inspection agency to inspect high-strength bolted connections and welded connections, to perform tests and prepare test reports. The Contractor will be responsible for all costs associated with failed tests.
 1. Testing agency shall conduct and interpret tests, and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
 2. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
 3. Testing agency may inspect structural steel at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.
 4. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

- B. Shop Bolted Connections: Inspect or test in accordance with AISC specifications.
- C. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds.
 - 3. Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option:
 - a. Liquid Penetrant Inspection: ASTM E165.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E164.
- D. Field Bolted Connections: Inspect in accordance with AISC specifications.
- E. Field Welding: Inspect and test during erection of structural steel as follows:
 - 1. Verify certification of welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds.
 - 3. Perform tests of welds as follows:
 - a. Liquid Penetrant Inspection: ASTM E165.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E164.

END OF SECTION

DIVISION 5 - METALS

SECTION 05300 - METAL DECKING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.02 SUMMARY

- A. Extent of metal decking is indicated on drawings, including basic layout and type of deck units required.
- B. Header Duct used in conjunction with cellular metal floor deck is specified in Division 16; not work of this section.

1.03 SUBMISSIONS

- A. General: Comply with pertinent provisions of Section 01300.
- B. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.
- C. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing, or other accessories.
- D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated or specified:
 - 1. AISI "Specification for the Design of Cold-Formed Steel Structural Members."
 - 2. AWS D1.3 "Structural Welding Code - Sheet Steel."
 - 3. SDI "Design Manual for Floor Decks and Roof Decks."
- B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS D1.1.

1. Welded decking in place is subject to inspection and testing. Expense of removing and replacing portions of decking for testing purposes will be borne by Owner if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.
- C. Underwriter's Label: Provide metal floor deck units listed in Underwriter's Laboratories "Fire Resistance Directory," with each deck unit bearing the UL label and marking for specific system detailed.
1. Provide cellular floor deck units listed in UL "Electrical Construction Materials List" with each cellular metal floor deck unit bearing UL labels and marking. Provide units which will permit use of standard header ducts and outlets for electrical distribution systems.
- D. FM Listing: Provide metal roof deck units which have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire rated construction.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
1. Metal Deck Units:
 - a. Bowman/E.G. Smith, Div. Cyclops Corporation.
 - b. Consolidated Systems, Inc.
 - c. Epic Metals Corporation.
 - d. Mac-Fab Products, Inc.
 - e. Roll Form Products, Inc.
 - f. United Steel Deck, Inc.
 - g. Vulcraft/Div. Nucor Corporation.
 - h. United Steel Deck, Inc.
 - i. Wheeling Corrugating Company.
 - j. Wolverine Deck Company.

2.02 MATERIALS

- A. Steel for Galvanized Metal Deck Units: ASTM A446, Grade A.
- B. Miscellaneous Steel Shapes: ASTM A36.
- C. Sheet Metal Accessories: ASTM A526, commercial quality, galvanized.
- D. Galvanizing: ASTM A653, G60.
- E. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).
- F. Acoustic Sound Barrier Closures: Manufacturer's standard mineral fiber closures.

2.03 FABRICATION

- A. General: Form deck units in lengths to span 3 or more supports, with flush, telescoped or nested 2" laps at ends and interlocking or nested side laps, unless otherwise indicated.
- B. Roof Deck Units: Provide deck configurations complying with SDI "Roof Deck Specifications," of metal thickness, depth, and width as shown.
- C. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045" min. (18 gauge) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.
- D. Roof Sump Pans: Fabricate from single piece of 0.071" min. (14 gauge) galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3" wide. Recess pans not less than 1-1/2" below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which metal decking is to be installed and correct conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install deck units and accessories in accordance with manufacturer's recommendations and approved shop drawings, and as specified herein.

1. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.
3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
6. Do not use floor deck units for storage or working platforms until permanently secured.

B. Fastening Deck Units:

1. Fasten floor deck units to steel supporting members by not less than 3/4" diameter fusion welds or elongated welds of equal strength, spaced not more than 12" o.c. with a minimum of 2 welds per unit at each support.
 - a. Tack weld or use self-tapping No. 8 or larger machine screws at 4'-0" o.c. for fastening end closures.
2. Fasten roof deck units to steel supporting members by not less than 1/2" diameter fusion welds or elongated welds of equal strength, spaced not more than 12" o.c. at every support, and at closer spacing where required for lateral force resistance. In addition, secure deck to each supporting member in ribs where side laps occur.
3. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
 - a. Use welding washers where recommended by deck manufacturer.
4. Mechanically fasten side laps of adjacent deck units between supports, at intervals not exceeding 24" o.c., using self-tapping No. 8 or larger machine screws.

C. Keep the interiors of cells that will be used as raceways free of welds having sharp points or edges.

D. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

E. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

- F. Hanger Slots or Clips: Provide UL approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.
1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.
 2. Locate slots or clips at not more than 14" o.c. in both directions, not over 9" from walls at ends, and not more than 12" from walls at sides, unless otherwise shown.
 3. Provide manufacturer's standard hanger attachment devices.
- G. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.
- H. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12" o.c. with at least one weld at each corner. Cut opening in roof sump bottom to accommodate drain size indicated.
- I. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking, and in voids between decking and other construction. Weld into position to provide a complete decking installation.
- J. Touch-up Painting: Cleaning and touch-up painting of field welds, abraded areas and rust spots, as required after erection and before proceeding with field painting, is included in Division 9 under Painting.

END OF SECTION

DIVISION 5 - METALS

SECTION 05400 - COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.01 GENERAL:

- A. Furnish labor, materials, tools, and equipment necessary or required to perform and complete the installation of cold formed framing as indicated on the drawings and specified herein. Shapes, sizes and accessories as specified and detailed shall establish the type of units and materials to be used to provide the functional and finished aesthetic requirements desired.
- B. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 SUMMARY:

- A. Extent of cold-formed metal framing is shown on drawings.
- B. Types of cold-formed metal framing units include the following:
 - 1. "C" shaped load bearing and non-load bearing steel studs.
 - 2. "C" shaped steel joists.
 - 3. Track Sections
 - 4. Hat Channels
 - 5. Clip Angles
- C. Related Sections include the following:
 - 1. Section 03300 - Concrete
 - 2. Section 04200 - Unit Masonry
 - 3. Section 05120 - Structural Steel
 - 4. Section 05500 - Miscellaneous Metal
 - 5. Section 06100 - Rough Carpentry
 - 6. Section 06200 - Finish Carpentry
 - 7. Section 07200 - Building Insulation
 - 8. Section 09250 - Gypsum Wallboard

1.03 REFERENCES:

- A. AISI - Specification for the design of cold-formed steel structural members, code of standard practice (COSP).
- B. ASCE 7 - Minimum design loads for building or other structures.
- C. ASTM A90 - Standard test method for weight (mass) of coating on iron and steel articles with zinc or zinc alloy coatings.
- D. ASTM A370 - Standard test methods and definitions for mechanical testing of steel products.

- E. ASTM A653 - Standard specification for steel sheet, zinc coated (galvanized) or zinc iron alloy coated (galvannealed) by the hot-dip process.
- F. ASTM A780 - Standard practice for repair of damaged and uncoated areas of hot-dip galvanized coatings.
- G. ASTM A924 - Standard specification for general requirements for steel sheet, metallic coated by the hot-dip process.
- H. ASTM A1003 - Standard specification for steel, sheet, cold rolled, carbon, structural, high strength low alloy and high strength low alloy with improved formability.
- I. ASTM A1008 - Standard specification for steel, sheet and strip, hot rolled, carbon, structural, high strength low alloy and high strength low alloy with improved formability.
- J. ASTM 1011 - Standard specification for steel, sheet and strip, hot rolled, carbon, structural, high strength low alloy and high strength low alloy with improved formability
- K. ASTM B633 - Standard specification for electrodeposited coatings of zinc and iron on steel.
- L. ASTM C754 - Specification for installation of framing members to receive screw attached gypsum wallboard, backing board or water resistant backing board.
- M. ASTM C840 - Standard specification for application and finishing of gypsum board.
- N. ASTM C955 - Standard 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.
- O. ASTM C1007 - Standard specification for installation of load bearing (transverse and axial) steel studs and related accessories.
- P. ASTM C1513 - Standard specification for steel taping screws for cold formed steel framing connections.
- Q. ASTM E84 - Standard test method for surface burning characteristics of building materials.
- R. ASTM E90 - Method for laboratory measurement of airborne sound transmission loss of building partitions.

1.04 DESIGN REQUIREMENTS:

- A. Fire Resistive Rating: Where fire rated construction is indicated on drawings, provide materials and construction that are identical to those assemblies whose fire resistance rating has been determined per ASTM E119 by a testing and inspecting organization acceptable to authorities having jurisdiction.
 - 1. Meet or exceed fire resistance requirements outlined under provisions of the GA-600 Fire Resistance Design Manual for wall and ceiling assemblies.
 - 2. Meet or exceed flame/fuel/smoke requirements of ASTM E84 surface burning characteristics for finish materials
- B. Sound Transmission Characteristics: For specified wall assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and

classified according to ASTM E413 by a qualified independent testing agency.

- C. AISI Specifications: Comply with AISI's current 'Specification for the Design of Cold-Formed Steel Structural Members' and the following for calculating structural characteristics of cold formed metal framing:
 - 1. CCFS Technical Bulletin: Current 'AISI Specification Provisions for Screw Connections'.
- D. Fire Rated Assemblies: Where framing units are components of the assemblies indicated for a fire resistance rating, including those required for compliance with governing regulations, provide units which have been approved by governing authorities.

1.05 SUBMISSIONS:

- A. All submissions shall be made in accordance with Section 01300 Submissions.
- B. Product Data: Submit manufacturers data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations
 - 2. Storage and handling requirements and recommendations
 - 3. Installation methods
- C. Structural Calculations (For Structural Load Bearing or Supporting Assemblies):
 - 1. Submit structural calculations prepared by manufacturer for approval. Submittal shall be sealed by a Professional Engineer registered in the state of the project
 - 2. Description of design criteria
 - 3. Engineering analysis depicting stress and deflection (stiffness) requirements for each framing application
 - 4. Selection of framing components, accessories and welded connection requirements
 - 5. Verification of attachments to structure and adjacent framing components
 - 6. Engineer shall have a minimum of five (5) years experience with projects of similar scope
- D. Shop Drawings (For Structural Load Bearing or Supporting Assemblies):
 - 1. Submit shop drawings prepared by the manufacturer showing plans, sections, elevations, layouts, profiles and product components locations, including anchorage, bracing, fasteners, accessories and finishes.
 - 2. Show connection details with screw types and locations, weld lengths and locations and other fastener requirements.

3. Where prefabricated or prefinished panels are to be provided, provide drawings depicting panel configurations, dimensions and locations
- E. Welders Certificates: Submit manufacturers certificates, certifying welders employed on work, verifying AWS qualifications within the previous 12 months.
- F. Mill Certificates: Signed by steel sheet producer indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and galvanized-coating thickness.

1.06 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: Materials shall be provided by a firm that is experienced in manufacturing cold-formed metal framing similar to that indicated for this Project and with a record of successful in-service performance.
 1. Assumes responsibility for designing cold-formed metal framing and connections to comply with performance requirements. This responsibility includes preparation of Shop Drawings and design calculations by a qualified professional engineer.
- B. Installer Qualifications: Work shall be installed by an experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Professional Engineer Qualifications: A professional engineer who is licensed to practice in the jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent. Engage a qualified Professional Engineer to prepare design calculations, shop drawings and other structural data.
- D. Mock-Up: When requested by the Architect or owner, contractor shall provide a 4'x4' mock-up for evaluation of workmanship for each type of cold formed metal framing specified/required by the project.
 1. Construct areas designated by Architect.
 2. Do not proceed with remaining work until material, details, and workmanship are approved by Architect.
 3. Refinish mock-up area as required to produce acceptable work.
 4. Demolish mock-up at a time as a designated by the Architect.

1.07 DELIVERY, STORAGE, and HANDLING:

- A. Store products in manufacturers unopened packaging until ready for installation.
- B. Store materials protected from exposure to rain, snow or other harmful weather conditions, at temperature and humidity conditions per AISI COSP Section F3.

1.08 Project Conditions:

- A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturers absolute limits.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Marino/WARE
 - 2. Clark Steel Framing Systems.
 - 3. Dietrich Metal Framing.

2.02 METAL FRAMING:

- A. System Components: With each type of metal framing required, provide manufacturer's standard U-shaped steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for applications indicated, as needed to provide a complete metal framing system.
- B. Materials and Finishes:
 - 1. For 16-gauge and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 50,000 psi; ASTM A 446, A 570, or A 611.
 - 2. For 18-gauge and lighter units, which will only be attached mechanically, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 37,000 psi; ASTM A 446, A 570, or A 611.
- C. Provide galvanized finish to metal framing components complying with ASTM A525 for minimum G90 coating.
 - 1. Finish of installation accessories to match that of main framing components, unless otherwise indicated.

- D. "C"-shaped Studs: Manufacturer's standard load-bearing steel studs of size, shape, and gauge indicated, with 2" flange and flange return lip.
- E. Punched Channel Studs: Manufacturer's standard factory-punched, load-bearing steel studs of size, shape, and gauge indicated, with 1.375" flange.
- E. Hat Shaped Furring Channels: 22 gauge with minimum 1/2" wide flanges. Minimum depth 3/4" unless otherwise noted on drawings.
- F. Joists: Manufacturer's standard C-shape sections of size, shape, and gauge indicated.
- G. Framing Accessories:
 - 1. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength equal to that of main components.
 - 2. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - a. Supplementary framing.
 - b. Bracing, bridging and solid blocking.
 - c. Web stiffeners.
 - d. End clips.
 - e. Gusset plates.
 - f. Stud kickers, knee braces and girts.
 - g. Hole reinforcing plates.
 - h. Backer plates.

2.03 FABRICATION:

- A. General: Framing components may be prefabricated into panels prior to erection. Fabricate cold-formed metal framing and accessories plumb, square, true to line, and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion.
 - 1. Fabricate framing assemblies in jig templates to hold members in proper alignment and position and to assure consistent component placement.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator.
 - 4. Fasten other materials to cold-formed metal framing by welding, bolting or screw fastening, according to shop drawings.
- B. Mechanical Fasteners: ASTM C1513, corrosion resistant coated, self-drilling, self-tapping steel drill screws. Minimum two (2) screws per connection.

- C. Fabrication Tolerances: Fabricate assemblies level, plumb and true to line, to a maximum allowable tolerance variation of 1/8 inch in 10 feet, and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.
- D. Reinforce, stiffen and brace framing assemblies to withstand handling, delivery and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION:

- A. Pre-installation Conference: Prior to start of installation of metal framing systems, meet at project site with installers of other work including door and window frames and mechanical and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.
1. Verify that concealed wood/sheet steel blocking has been installed the proper locations.
- B. Examine substrates to which metal framed construction attaches or abuts. Verify pre-set hollow metal frames, cast in anchors, and structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of wall framing.
- C. Preparation: Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.02 INSTALLATION, GENERAL:

- A. Manufacturer's Instructions: Install metal framing systems in accordance with ASTM C 1007 and manufacturer's printed or written instructions and recommendations, unless otherwise indicated.
- B. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24" o.c. spacing for nail or power-driven fasteners. Provide fasteners at corners and ends of tracks.

1. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
 2. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
 3. Install supplementary framing, blocking, and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim, and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.
- C. Installation of Wall Stud System: Secure studs to top and bottom runner tracks by screw fastening at both inside and outside flanges.
1. Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.
 2. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of the stud system. Independently frame both sides of joints.
 3. Install horizontal stiffeners in the stud system, spaced (vertical distance) at not more than 4'-6" o.c. Mechanically fasten at each intersection.
 4. Fasten hole reinforcing plates over web penetrations that exceed the size of the manufacturer's standard punched openings.
- D. Erection Tolerances: Bolt or weld wall panels (at both horizontal and vertical junctures) to produce flush, even, true to line joints.
1. Step in face and jog in alignment between panels not to exceed 1/16".
- E. Insulation: Install insulation in exterior framing members, headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

3.03 REPAIRS AND PROTECTION:

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings and all welded areas on fabricated and installed cold-formed metal framing with galvanized repair paint, according to ASTM A 780 and manufacturer's written instructions. Wire brush slag off of all welds.

END OF SECTION

DIVISION 5 - METALS

SECTION 05500 - MISCELLANEOUS METAL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work included: Provide all miscellaneous metal and metal fabrications, complete and installed, as shown on the Drawings, specified herein, or needed for a complete and proper installation of all building components, which may not be specifically called for under other sections of these Specifications.
- B. Related Sections:
 - 1. Section 04200 - Unit Masonry
 - 2. Section 05120 - Structural Steel
 - 2. Section 05210 - Steel Joists and Girders
 - 3. Section 05300 - Metal Decking
 - 4. Section 05400 - Cold-Formed Metal Framing
 - 5. Section 05512 - Wrought-Iron Railings
 - 6. Section 05514 - Steel Railings
 - 7. Section 05516 - Aluminum Railings

1.02 QUALITY ASSURANCE

- A. Standards: Comply with standards specified herein and as listed in Section 01085 - Applicable Standards.
- B. Qualifications of Personnel: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Welding: Perform all shop and field welding required in connection with the work of this Section, adhering strictly to the current pertinent recommendations of the American Welding Society.

1.03 SUBMISSIONS

- A. Comply with provisions of Section 01300 and as modified below.
- B. Product Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturers' product data, specifications, and other data required to demonstrate compliance with specified requirements.
- C. Shop Drawings: The Contractor shall prepare and submit shop

drawings covering all items of work of this section. The drawings shall show all dimensions and details of construction, installation and relation to adjoining and related work where same requires cutting or close fitting, and shall show all reinforcement, gauges of metal, anchorage, reinforcing, and other work required for complete installation.

1. Provide templates for bolts and/or anchorage installation by other trades.

1.04 COORDINATION

- A. All work under this section shall be properly coordinated with the work of other sections and contracts which affects or is affected by work of this section. To this end, close cooperation shall exist between trades and/or Contractors installing other work in any way affecting or affected by work under this section.
- B. Shop drawings shall be exchanged between the trades and/or Contractors so affected to the end that all work shall properly receive or be received by work under other sections, and the entire operation shall be a harmonious whole.

1.05 WORKMANSHIP AND INSTALLATION

- A. All work included under this section shall be installed by the contractor at the proper time, and as rapidly as progress of the adjacent and connecting work will permit. All work to be set by others shall be delivered when required by them. The Contractor shall consult with the various other contractors installing adjoining work regarding the methods to be employed in connecting the several materials. Holes and connections for the work of other trades shall be provided as necessary.
- B. All work shall be erected and secured plumb and true to line, and finished smooth and clean from fine and noticeable irregularities or file marks. Ferrous metals entering or adjoining exterior masonry surfaces shall be insulated from it with lead shields and by an approved non-staining elastic cement of approved color.

1.06 VERIFYING CONDITIONS

- A. Verify all measurements in the field, as required, for work fabricated to fit conditions at the building. Before starting work, examine all adjoining work on which the work of this section is in any way dependent for perfect workmanship and fit. Do such corrective work to adjoining work as may be necessary to make the work of this section perfect in all respects.

1.07 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All metals shall be free from defects impairing strength or durability, and of best commercial quality for purposes specified. Metals shall be made with structural properties to withstand safely the strains and stresses to which they will normally be subjected.
- B. For fabrication of the work of this Section which will be exposed to view, use only those materials which are smooth and free from surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness.
- C. Standards: All materials shall comply with the latest version of the standard documents indicated:
1. Steel plates, shapes, and bars: ASTM A36.
 2. Steel plates to be bent or cold formed: ASTM A283, Grade C.
 3. Steel tubing, hot-formed, welded, or seamless: ASTM A501.
 4. Steel bars and bar-size shapes: ASTM A306 Grade 65, or ASTM A36.
 5. Cold-finished steel bars: ASTM A108, grade as selected by the fabricator.
 6. Cold-rolled carbon steel sheets: ASTM A336.
 7. Galvanized carbon steel sheets: ASTM A526, with ASTM A525, G90, zinc coating.
 8. Stainless steel sheets: Type 302/304 of American Iron and Steel Institute, 24 gauge, with No. 4 finish.
 9. Gray iron castings: ASTM A48, Class 30.
 10. Malleable iron castings: ASTM A47, grade as selected by the fabricator.
 11. Steel pipe: ASTM A53, type as selected, Grade A, black finish unless galvanizing is required, standard weight (Schedule 40) unless otherwise indicated.
 12. Concrete inserts: Threaded or wedge type, galvanized ferrous

castings, either malleable iron ASTM A47 or cast steel ASTM A27. Provide bolts, washers, and shims as required, hot-dip galvanized, ASTM A153.

13. Non-shrink non-ferrous grout: CE CRD C588.
14. Aluminum extrusions shall be free of roll marks, scratches, rolled-in streaks and any other defect which may affect the uniform appearance of finished surfaces.
15. Aluminum extrusions must be at least 0.8" thick and sheet or plate, at least No. 16 gauge.
16. Aluminum pipe: 6063-T6 alloy.
17. Schedule of Aluminum Finishes:
 - a. Exposed exterior extrusions (except saddles, louvers, railings, and windows): 215-R1.
 - b. Exposed exterior sheet and plate: 215-R1.
 - c. Exposed interior extrusions: 204-R1.
 - d. Exposed interior sheet and plate: 204-R1.
 - e. Extrusion, sheet plate not exposed: Mill.
 - f. Casting: F.

2.02 WORKMANSHIP

A. General workmanship requirements:

1. Use materials of size and thickness shown, or if not shown, of required size and thickness to produce sufficient strength and durability in the finished product.
2. Work to dimensions shown or accepted on the Shop Drawings, using proven details of fabrication and support.
3. Use type of materials shown or specified for the various components of the work.
4. Form exposed work true to line and level, with accurate angles and surfaces and with straight, sharp edges.
5. Ease the exposed edges to a radius of approximately 0.8-mm (1/32") unless otherwise shown.
6. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
7. Weld corners and seams continuously, complying with AWS

recommendations. At exposed connections, grind exposed welds smooth and flush; match and blend with adjoining surfaces.

8. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, use Phillips flat-head (countersunk) screws or bolts.
9. Provide for anchorage of the type shown. Coordinate with supporting structure. Fabricate and space the anchoring devices to provide adequate support for intended use.
10. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

2.03 FABRICATIONS

A. Rough hardware:

1. Provide bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete and other structures.
2. Manufacture or fabricate items of sizes, shapes, and dimensions required.
3. Provide malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

B. Loose bearing and leveling plates:

1. Provide loose bearing and leveling plates for steel items bearing on concrete construction, made flat, free from warps or twists, and of required thickness and bearing area.
2. Drill plates for anchor bolts and for grouting as required.
3. Galvanize after fabrication.

C. Miscellaneous framing and supports:

1. Provide miscellaneous steel framing and supports which are not part of structural steel framework, as required to complete work.
3. Fabricate miscellaneous units to sizes, shapes, and profiles shown; or, if not shown, of required dimensions to receive adjacent other work to be retained by framing.
4. Fabricate the miscellaneous units from structural steel shapes, plates, and steel bars of welded construction with mitered joints for field connection, unless otherwise shown.

5. Cut, drill, and tap units to receive hardware.
6. Equip units with integrally welded anchors for casting into concrete or building into masonry, and furnish inserts if units must be installed after concrete is placed.
7. Except as otherwise shown on Construction Drawings, space anchors at 24" on centers, and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.
8. Galvanize miscellaneous frames and supports where indicated.

D. Loose Lintels:

1. Provide loose lintels for all trades, over all openings where lintels are not shown on structural drawings or where door bucks over 3'-0" wide are not reinforced. Provide loose lintels for all door bucks, greater than 5'-0" carrying masonry above. For each 4" thickness of masonry, provide one 3 1/2" x 3 1/2" x 5/16" angle at spans 3'-0" or less; 6" x 3 1/2" x 3/8" angle at spans 3'-0" to 6'-4". For 6" thick walls, provide WT 7 x 11 for spans 3'-0" to 6'-4". For spans 6'-4" to 8'-0" at 6" walls, provide WT 7 x 13. Provide lintels at heads of all aluminum bucks where not indicated on structural drawings.
2. All exterior lintels and miscellaneous framing to be galvanized.

E. Steel framed stairs:

1. General:

- a. Use welding for joining pieces together, unless otherwise shown or specified. Fabricate units so that bolts and other fastenings do not appear on finish surfaces. Make joints true and tight, and make connections between parts lightproof tight. Provide continuous welds, ground smooth where exposed.
- b. Construct stair units to conform to sizes and arrangements shown. Provide all components for the support of stairs and platforms.

2. Stair framing:

- a. Fabricate stringers from structural steel channels, or plates, or a combination thereof as shown. Provide closures for ends of stringers.
 - b. Construct platforms of structural steel channel headers and miscellaneous framing members in the arrangement shown. Bolt or weld stringers to stringers.
3. Metal pan units: Form from structural steel sheet of the gauge shown on the drawings, and to the configuration shown on the drawings. Provide platforms of the same metal and gauge as

indicated for pans, unless otherwise indicated.

F. Saddles:

1. Saddles shall be cast abrasive aluminum fitted to full width of frame opening.
2. Set level by shimming in full bed of mastic and fasten with FHCS screws.

2.04 FASTENERS

A. General: Provide zinc-coated fasteners for exterior use and where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Standards: All fasteners shall comply with:

1. Bolts and nuts: Regular hexagon-head type, ASTM A307, Grade A.
2. Lag bolts: Square-head type, Fed. Spec. FF-B-561.
3. Machine screws: Cadmium plated steel, Fed. Spec. FF-S-92.
4. Wood screws: Flat-head carbon steel, Fed. Spec. FF-S-111.
5. Plain washers: Round, carbon steel, Fed. Spec. FF-W-92.
6. Masonry anchorage devices: Expansion shields, Fed. Spec. FF-S-325.
7. Toggle bolts: Tumble-wing type, Fed. Spec. FF-B-588, type, class, and style required.
8. Lock washers: Helical spring type carbon steel, Fed. Spec. FF-W-84.

2.05 PAINT/FINISHING

A. Shop priming:

1. Shop prime all ferrous miscellaneous metal work, except surfaces and edges to be field welded and galvanized surfaces, unless otherwise specified.
 - a. Remove oil, grease, and similar contaminants in accordance with SSPC-SP-1.
 - b. Clean off heavy rust and loose mill scale in accordance with SSPC-SP-2 or SSPC-SP-3.
 - c. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's recommendations, and at a rate to provide the recommended dry film thickness.

2. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.
3. Primer for ferrous metals: 10-1009 Gray Metal Primer by Tnemec Co., Inc.
4. Primer for Loose and Hung Steel Lintels: 50-330 Poly-Ura-Prime by Tnemec Co., Inc.
 - a. Lintel angles for exterior veneer, either loose or hung, shall be hot dip galvanized. Final painting shall be after installation, but prior to installation of items such as windows or louvers that would conceal the lintel or portion thereof.
5. Non-visible ferrous metals, such as structural steel, bearing plates or anchorage, which will be exposed to building cavities or set below grade shall be painted with Benjamin more M47/M48 Coal Tar Epoxy.
6. All listed primers shall be compatible with finish coats of paint. Coordinate selection of metal primer with actual finish paint provided under Section 09900 of these Specifications.

2.06 GALVANIZING

- A. Provide hot-dip zinc coating for those items shown or specified to be galvanized, as follows:
 1. ASTM A153 for galvanizing iron and steel hardware.
 2. ASTM A123 for galvanizing rolled, pressed, and forged steel shapes, plates, bar, and strip 3 mm (1/8") thick and heavier.
 3. ASTM A386 for galvanizing assembled steel products.
- B. Galvanizing repair paint: Use a high zinc dust content paint for regalvanizing welds in galvanized steel, or to repair damage incurred during handling and installation, complying with MIL SPEC MIL-P-21035.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions under which miscellaneous metal items are to be installed, and correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete construction. Coordinate delivery of such items to project site.

3.03 INSTALLATION

A. Setting loose plates:

1. Clean concrete bearing surfaces free from bond-reducing materials, and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.
2. Set loose leveling and bearing plates on wedges, or other adjustable devices.
3. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims; but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
3. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

B. Setting lintels:

1. Bear 8" minimum at each side of opening wherever possible. Furnish clip angles or other approved connection securely anchored to supporting construction and bolt to lintels wherever 8" bearing is not possible.

C. Installing stairs:

1. Install in accordance with approved shop drawings, providing all anchorage, welding, or bearing as specified on said shop drawings.

- D. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

E. Cutting, fitting, and placement:

1. Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications.
2. Set work accurately in location, alignment, and elevation, and make plumb, level, true, and free from rack, measured from

established lines and levels.

3. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar construction.
 4. Fit exposed connections accurately together to form tight hairline joints.
 5. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
 6. Grind exposed joints smooth, and touch up shop paint coat. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
- F. Field welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of weld made, and methods in correcting welding work.
- G. Touch up painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide minimum dry film thickness of 2.0 mils.

3.04 CLEANING, ACCEPTANCE, AND PROTECTION

- A. All work shall be properly protected from defacement or damage. Defective work shall be satisfactorily repaired or removed and replaced at no additional cost to the Owner.
- B. Upon completion, inspection, and approval by the Architect, the ornamental work of this section shall be cleaned with a mild soap and water or a petroleum distillate and all temporary protective coatings removed, except Methacrylate Lacquer.
- C. All operative items shall be adjusted to work properly and the work left whole, clean, and in perfect condition.

END OF SECTION

DIVISION 6 - WOOD AND PLASTICS

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

1.02 SUMMARY

- A. Types of work in this section include rough carpentry for:
 - 1. Framing with dimensional lumber as shown on the drawings and as specified herein.
 - 2. Plywood, OSB, particleboard panels and/or other sheathing as shown on the drawings and as specified herein.
 - 3. Wood blocking, nailers and/or sleepers.

1.03 RELATED SECTIONS

- A. 06170 - Prefabricated Structural Wood.
- B. 06164 - Gypsum Sheathing.
- C. 06200 - Finish Carpentry.
- D. 07200 - Building Insulation.
- E. 07231 - Air Vapor Barrier System.
- F. 07241 - Direct Applied Exterior Finish Systems.
- G. Various Division 7 Roofing Specifications.
- H. Various Division 9 Finishes Specifications.
- F. If designated as a LEED project, then also:*
 - 1. Division 1 Section "LEED Requirements" for recycled content and regional materials requirements, submittals and additional LEED requirements.*
 - 2. Division 1 Section "Construction Waste Management" for recycling construction waste.*

1.04 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated.

- B. Exposed Framing: Framing not concealed by other construction.
- C. Dimensional Lumber: Lumber of 2 inches nominal or greater, but less than 5 inches nominal in least dimension.

1.05 QUALITY ASSURANCE

- A. All materials shall be provided and all work shall be performed in accordance with the NYS Uniform Building Code requirements (current version).
- B. Lumber shall be certified by the following authorities/grading agencies:
 - 1. NELMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.
 - 7. FSC: Forest Stewardship Council.

1.06 SUBMISSIONS

- A. All submissions shall be made in accordance with Section 01300 - Submissions and as modified below.
- B. Material Certificates: Where dimensional lumber is provided to comply with minimum allowable unit stresses, submit a listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in forms of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.
- C. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.
 - 1. Preservative Treatment: For each type specified, include certification by treating plant stating type of preservative solution and pressure process used, note amount of preservative retained, and conformance with applicable standards.
 - a. For water-borne treatment include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.
 - b. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

- D. *LEED Submittals; for projects requiring LEED certification, submit the following additional information:*
1. *Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 01352 "LEED Requirements".*
 2. *Credit EQ 4.1: Manufacturers' product data for interior field-applied construction adhesive, including printed statement of VOC content in accordance with Section 01352 "LEED Requirements".*
 3. *Credit EQ 4.4: Composite wood manufacturer's product data for each composite wood product used indicating that product's bonding agent contains no urea formaldehyde in accordance with Section 01352 "LEED Requirements".*
 4. *Forest Certification for the following wood products; materials produced from wood obtained from forests certified by a Forest Stewardship Council (FSC)-accredited certification body to comply with FSC 1.2, "Principles and Criteria":*
 1. *Dimensional lumber framing.*
 2. *Plywood.*

1.07 DELIVERY, STORAGE AND PRODUCT HANDLING

- A. *Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels flat with spacers between each bundle to provide for air circulation around stacks and under coverings.*

PART 2 - MATERIALS

2.01 LUMBER, GENERAL

- A. *Lumber Standards: Manufacture lumber to comply with "Voluntary Lumber Standard" DOC PS20-10, or most current edition, and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.*
1. *Grade Stamps: Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill..*
 2. *Where nominal sizes are indicated, provide actual sizes required by DOC PS20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.*
 3. *Provide dressed lumber, S4S, unless otherwise indicated.*
 4. *Plywood Standards: Comply with the latest edition of U.S.*

Product Standard PSI and APA performance standards.

5. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2" or less in nominal thickness, unless otherwise indicated.
- B. Inspection Agencies: Inspection agencies and the abbreviations used to reference with lumber grades and species include the following:
 1. SPIB: Southern Pine Inspection Bureau.
 2. WWPAA: Western Wood Products Association.
- C. Grade Stamps: Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing and mill.

2.02 FRAMING LUMBER

- A. For items of dimensional lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content of any species, unless otherwise noted on the Construction Drawings.
 1. Hem-fir (north); NLGA.
 2. Mixed southern pine; SPIB.
 3. Spruce-pine-fir; NLGA.
 4. Hem-fir; WCLIB, or WWPAA.
 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPAA.
 6. Species group below includes hem-fir and spruce-pine-fir (south).
 7. Western woods; WCLIB or WWPAA.
 8. Northern species; NLGA.

2.03 MISCELLANEOUS LUMBER

- A. Provide wood for support or attachment of other work including cant strips, nailers, blocking, furring, grounds, stripping, rooftop equipment bases and support curbs, and similar members. Provide lumber sizes indicated, worked into shapes shown.
 1. Grade: Standard grade light framing size lumber of any species or board size lumber as required. No. 3 Common or Standard grade boards per WCLIB or WWPAA rules or No. 3 boards per SPIB rules.

2.04 PLYWOOD PANELS AND ROOF SHEATHING

- A. Plywood must contain no urea-formaldehyde resins.
- B. Telephone and Electrical Equipment Backing Panels: DOC PS1, Exposure

1, C-D Plugged, in thicknesses as indicated, not less than ½ inch nominal thickness.

C. Plywood Roof Sheathing: Exposure 1, Structural 1 sheathing.

1. Span Rating: Not less than 48/24.

2. Nominal Thickness: Not less than 23/32 inch.

2.05 MISCELLANEOUS MATERIALS

A. Fasteners and Anchorages: Provide size, type, material, and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers, and anchoring devices. Provide metal hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommended nails.

1. Where rough carpentry work is exposed to weather, in ground contact, pressure-preservative treated, or in areas of high relative humidity, provide fasteners and anchorages with a hot-dip zinc coating, complying with ASTM A153.

2. Nails, brads and staples shall comply with ASTM F 1667.

3. Power-Driven fasteners shall comply with NES NER-272.

4. Wood Screws shall comply with ASME B18.6.1.

5. Lag Bolts shall comply with ASME B18.2.1.

6. Bolts: Steel bolts shall comply with ASTM A307, Grade A; with ASTM A563 hex nuts and, where so indicated, flat washers.

7. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

a. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

b. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

8. Metal Framing Anchors (where applicable):

a. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or engineered-approved equals by one of the following:

a. Simpson Strong-Tie Co., Inc.

- b. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those indicated of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
 - c. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet, complying with ASTM A 653, G60 (Z180) coating designation.
 - d. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- D. Building Paper: Asphalt saturated felt, non-perforated conforming to ASTM D226.
- E. In the absence of requirements of section 07231, provide a self-adhering vapor-permeable air barrier membrane; Blueskin Breather manufactured by Henry; a self-adhering membrane consisting of a microporous film laminate, backed with a specially applied adhesive, which allows water vapor to permeate through while acting as a barrier to air and rain water. Membrane shall have the following physical properties:
- 1. Air leakage: <0.002 CFM/ft² @ 1.6 lbs/ft² to ASTM E283-91.
 - 2. Water vapor permeance: 37 perms to ASTM E 96.
 - 3. Membrane Thickness: 17 mils.
 - 4. Low temperature flexibility -40 degrees F: Pass to ASTM D3111.
 - 5. Hydrostatic Water Resistance: 18 psi ASTM D751 Procedure
- E. Sill Sealer Gaskets: Glass fiber resilient insulation fabricated in strip form for use as a sill sealer; 1" nominal thickness compressible to 1/32"; selected from manufacturer's standard widths to suit width of sill members indicated; in rolls of 50' or 100' in length.
- F. Water-Repellent Preservative: (for exposed ends of posts and beams, not for treating cuts in preservative-treated lumber): NWWDA-tested and accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.
- G. Construction Adhesive: Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.06 FIRE RETARDANT-TREATED LUMBER

- A. General: Where fire-retardant-treated lumber and plywood are indicated, use materials impregnated with fire-retardant chemicals by a pressure process or other means acceptable to authorities having jurisdiction to produce products with the following fire-test-response characteristics:
 - 1. Flame-spread index of not greater than 25 when tested according to ASTM E 84.
- B. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
- C. Exterior-Type Fire-Retardant Treatment: Organic-resin-based formulation that shows no increase in flame spread of treated material after being weathered according to ASTM D 2898, Method A.
- D. Kiln-dry material after treatment to levels required for untreated material. Do not use material that does not comply with requirements for untreated material or is warped or discolored.
- E. Acceptable pressure-impregnated products include Hoover's Pyro-Guard for interior applications and Exterior Fire-X for exterior applications.

2.07 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: Where lumber or plywood is indicated as "Trt-Wd" or "Treated," or is specified herein to be treated, comply with applicable requirements of AWPB Standards C2 (Lumber) and C9 (Plywood) and of AWPB Standards listed below, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPB C31 with inorganic boron (SBX). Mark each treated item with the AWPB Quality Mark Requirements, and with the quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. Pressure-treat above-ground items with water-borne preservatives to comply with AWPB LP-2, acceptable to authorities having jurisdiction and containing no arsenic or chromium. After treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Do not use material that is warped or does not comply with requirements for untreated material. Treat indicated items and the following:
 - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

- c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
- d. Wood framing members less than 18" above grade, in crawl spaces or unexcavated areas.
- e. Wood floor plates that are installed over concrete slabs-on-grade.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Discard units with material defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- B. Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.
- C. Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other work.
- D. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
 - 1. Unless otherwise indicated on the Construction Drawings, framing shall be at 16" centers.
- E. Metal Anchors for Engineered Wood Products (where applicable): Install metal anchors to comply with manufacturer's written instructions.
- F. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber.
- G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- H. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards. Comply with Table 2304.10.1 - "Fastening Schedule" in ICC's International Building Code. Provide all blocking and framing as indicated and as required in order to support facing materials, fixtures, specialty items, and trim.

- I. Use common wire nails, except as otherwise indicated; use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.
- J. Do not splice structural members between supports.

3.02 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Provide wherever shown and where required for attachment to other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- B. Attach to substrate as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
- C. Provide permanent grounds of dressed, preservative treated, key-beveled lumber not less than 1-1/2" wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.03 WALL AND PARTITION FRAMING

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness, whose widths equal that of studs. Fasten plates to supporting construction.
 - 1. Space wood studs at 16 inches o.c., unless otherwise indicated.
 - 2. Provide continuous horizontal blocking at mid-height of partitions more than 96 inches high, using members of 2-inch nominal thickness, and of same width as wall or partitions.
- B. Construct corners and intersections with three (3) or more studs.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb (jack) studs.
 - 1. For load-bearing walls, provide double-jamb (jack) studs for openings 60 inches and less in width, and triple-jamb (jack) studs for wider openings. Provide headers of depth indicated on the drawings.
- D. Provide diagonal bracing in walls, at locations indicated, full-story height, unless otherwise indicated.

3.04 FLOOR JOIST FRAMING

- A. Space joists at 16 inches o.c., unless otherwise indicated.
 - 1. Set each joist with crown up.

2. Provide continuous horizontal blocking at mid-span of joists, using members of same nominal size of joists.
- B. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of joists.
1. Provide double-joists, nailed together, directly beneath non-bearing partition walls when joist run parallel to said walls.

3.05 RAFTER FRAMING

- A. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut ridge, place directly opposite each other and nail to ridge member, or use metal ridge hangers.
1. Space wood rafters at 16 inches o.c., unless otherwise indicated.
 2. Set each rafter with crown up.
- B. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

3.06 PLYWOOD SHEATHING

- A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Install with the long dimension of the panel across supports, except where noted, and with panel continuous over two or more spans. Suitable edge support shall be provided where indicated on drawings (or in recommendations of the American Plywood Association) by use of panel clips, tongue-and-groove panels, or lumber blocking between joists. Panel end joints shall occur over framing. Allow 1/8-inch spacing at panel ends and 1/4-inch at panel edges, unless otherwise recommended by the panel manufacturer.
- C. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
- D. Nail 6 inches o.c. along panel edges and 12 inches o.c. at intermediate supports, except that when supports are spaced 48 inches o.c. or more, space nails 6 inches o.c. at all supports. Use 6d common nails for panels 1/2-inch and less and 8d for greater thicknesses, except that when panels are 1-1/8 inch, use 8d ringshank or 10d common.

3.07 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

DIVISION 6 - WOOD AND PLASTICS

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including General and Supplementary Conditions, Division 1 Specification sections, apply to work of this section.

1.02 SUMMARY

- A. Types of work in this section include finish carpentry for:
 - 1. Exterior standing and running trim.
 - 2. Interior standing and running trim.
 - 3. Interior plywood.
 - 4. Window stools & aprons.
 - 5. Closet shelving.
- B. Casework, cabinetry, countertops, and wainscot paneling systems are specified in other Division 6, Division 11, and Division 12 sections.

1.03 RELATED SECTIONS

- A. 06100 - Rough Carpentry.
- B. Various Division 9 Finishes Specifications.
- C. *If designated as a LEED project, then also:*
 - 1. *Division 1 Section "LEED Requirements" for recycled content and regional materials requirements, submittals and additional LEED requirements.*
 - 2. *Division 1 Section "Construction Waste Management" for recycling construction waste.*

1.04 QUALITY ASSURANCE

- A. Lumber: Comply with Voluntary Product Standard PS-20. Lumber shall bear grade and trademark of the association under whose rule it is produced.
 - 1. Southern Forest Products Association (SFPA).
 - 2. West Coast Lumber Inspection Bureau (WCLIB).

3. American Plywood Association (APA).
 4. Western Wood Products Association (WWPA).
 5. American Wood Preservers Bureau (AWPB).
 6. National Woodwork Manufacturer's Association (NWMA).
 7. National Hardwood Lumber Association (NHLA).
 8. Architectural Woodwork Institute (AWI).
 9. Wood Moulding and Millwork Producers (WM).
 10. Forest Stewardship Council (FSC).
- B. Plywood Grading Rules:
1. U.S. Product Standard PS 1-83 for Construction and Industrial Plywood.
 2. American Plywood Association (A.P.A.).
- C. Perform finish carpentry in accordance with AWI Quality Standards, "Custom" grade, unless otherwise noted.

1.05 SUBMITTALS

- A. All submissions shall be made in accordance with Section 01300 - Submissions and as modified below.
- B. Submit shop drawings and product data for architectural woodwork. Indicate materials, component profiles, jointing details, finishes, and accessories.
1. If requested, provide 6" long samples of trim pieces.
- C. *LEED Submittals; for projects requiring LEED certification submit the following:*
1. *Submit recycled content and regional materials documentation for each type of product provided under work of this Section in accordance with Section 01352 "LEED Requirements".*
 2. *Credit EQ 4.1: Manufacturers' product data for interior field-applied construction adhesive, including printed statement of VOC content in accordance with Section 01352 "LEED Requirements".*
 3. *Credit EQ 4.4: Composite wood manufacturer's product data for each composite wood product used indicating that product's bonding agent contains no urea formaldehyde in accordance with Section 01352 "LEED Requirements".*

4. *Forest Certification for the following wood products; materials produced from wood obtained from forests certified by a Forest Stewardship Council (FSC)-accredited certification body to comply with FSC 1.2, "Principles and Criteria":*

a. Finish lumber and moldings.

b. Finish plywood, veneers.

1.06 DELIVERY, STORAGE AND PRODUCT HANDLING

- A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.
- C. Do not deliver finish carpentry materials, until painting, wet work, grinding, and similar operations which could damage, soil, or deteriorate woodwork have been completed in installation areas.
- D. Deliver interior finish carpentry only when environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - MATERIALS

2.01 SEASONING

- A. Moisture Content: Except grades and species having a definite moisture content limitation under established grading rules, lumber shall be kiln-dried to a maximum moisture content of twelve percent (12%).

2.02 EXTERIOR STANDING AND RUNNING TRIM

- A. Trim shall be of sizes, configurations, and profiles as indicated on the drawings for the following applications.
 - 1. Finished lumber.
 - 2. Door and window casings.

3. Fascia, rake, and associated trim.
 4. Other applications as may be detailed on the drawings.
- B. Exterior applications shall be clear all-heart redwood, clear heart western red cedar, southern yellow pine, or black locust, unless otherwise noted on the drawings as a different species or resin-based, hardboard, or composite material.
1. Provide WM grade P for opaque/painted finish.
 2. Provide WM grade N for natural/stained finish.

2.03 INTERIOR STANDING AND RUNNING TRIM

- A. Trim shall be of sizes, configurations, and profiles as indicated on the drawings for the following applications.
1. Finished lumber.
 2. Door and window casings.
 3. Wall base molding.
 4. Chair rails.
 5. Crown moldings.
 6. Picture moldings.
 7. Other applications as may be detailed on the drawings.
- B. Interior softwood applications shall be select eastern white pine or sapwood birch; hardwood applications shall be white oak, red oak, or hard maple, unless otherwise noted on the drawings as a different species or resin-based, hardboard, or composite material.
1. Provide WM grade P for opaque/painted finish.
 2. Provide WM grade N for natural/stained finish.

2.04 INTERIOR PLYWOOD

- A. Exposed finished plywood applications shall utilize furniture-grade plywood of a face species coordinating with specified trim or as indicated on the drawings.
1. Provide Type II interior sound grade for opaque/painted finish.
 2. Provide Type II interior grade A for natural/stained finish.
- B. Thicknesses shall be as indicated on the drawings.

1. Shelving plywood shall be nominal 3/4" minimum.
- C. Comply with PS 1-83. Interior plywood in proximity to water (toilet rooms, sinks, etc.): manufactured with exterior glue.
 1. Plywood must contain no urea-formaldehyde resins.

2.05 WINDOW STOOLS & APRONS

- A. Window stools shall be constructed of hardwood lumber species as indicated on the drawings. If no species is indicated, bids shall be based upon red oak.
 1. Utilize nominal 1" board stock for widths of 7-1/4" or less. For wider applications, utilize nominal 5/4" board stock.
 2. Exposed edges shall be bullnosed.
- B. Aprons shall be of similar species as window stools and shall be wide enough to cover rough wood blocking or GWB edge transition beneath.

2.06 MISCELLANEOUS MATERIALS

- A. Fasteners and Anchorages: Provide nails, screws, and other anchoring devices of the proper types, size, material, and finish for application indicated to provide secure attachment, concealed where possible, and complying with applicable Federal Specifications and reference AWI standard.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Condition materials to average prevailing humidity conditions in installation areas prior to installing.
- B. Prime and backprime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Section 09900 - Painting & Staining.

3.02 INSTALLATION

- A. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacturer with respect to surfaces, sizes, or patterns.
- B. Product joints which are true, tight, and well nailed with all members assembled in accordance with the Drawings. Field sand all finish trim material smooth, except Cedar, to remove saw marks, raised grain, etc. Cut all corners square and ease slightly.

- C. Jointing: Make joints to conceal shrinkage; miter exterior joints; cope interior joints; miter or scarf end-to-end joints. Install trim in pieces as long as possible, jointing only where solid support is obtained.
 - 1. Door and window casings shall be single lengths without splicing.
- D. Fastening:
 - 1. Install items straight, true, level, plumb, and firmly anchored in place.
 - 2. Where blocking or backing is required, coordinate as necessary with other trades to ensure placement of required backing and blocking in a timely manner.
 - 3. Nail trim with finish nails of proper dimension to hold the member firmly in place without splitting the wood.
 - 4. Nail exterior trim with galvanized nails, making joints to exclude water.
 - 5. On exposed work, set nails for putty.
- E. Prime paint surfaces in contact with cementitious materials or separate with felt.

3.03 INSTALLATION OF OTHER ITEMS

- A. Set items at locations shown, in perfect alignment and elevation, plumb, level, straight, true and free from rack, scribed to adjoining work.
- B. Appearance: finished surface shall be free of tool marks.

3.04 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION

- A. Keep premises in a neat, safe, and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends, and debris.
- B. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.
- C. Clean finish carpentry work on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.
- D. Protection: Installer of finish carpentry work shall advise Contractor of final protection and maintain condition necessary to ensure that work will be without damage or deterioration at time of acceptance.

END OF SECTION

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07534 - SBS MODIFIED BITUMEN ROOFING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS / DESCRIPTION OF WORK

A. Related Documents:

1. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Extent of Work:

1. Provide and install modified bitumen roofing system where shown on the drawings and specified herein. Work shall include, but not be limited to the following:
 - a. Furnish and install SBS roofing system with flashings and all other incidental and accessory items to comprise a complete roofing system.
 - b. Removal of and legal disposal of existing roofing and insulation to the depths as shown on the Contract Drawings if required for a roof reconstruction project or as required for a new roof installation.
 - c. Re-Securement of the decking; where applicable.
 - d. New insulation.
 - e. New cover board.
 - f. New SBS modified bitumen roofing system, Vapor Barriers, Hot mopped base/ heat-welded cap sheet.
 - g. New wall and base flashing, expansion joints.
 - h. Flashing of all new roof penetrations.
 - i. New extruded fascia system, gravel stops, wall copings and/or counter flashing and termination bars.
 - j. Miscellaneous sheet metal or metal flashing.
 - k. Manufacturer's Edge-to-Edge guarantee.
 - l. New wood blocking and anchor bolts around roof perimeter, roof penetrations, and similar locations, as required for the complete installation of the modified bitumen roofing system, and to meet new perimeter edge heights.

- m. Installation of new equipment curbs where indicated.
- n. Walkways pads to all HVAC Roof top equipment.
- o. Provision of new tapered cants as required so as to meet new blocking at perimeter edges.
- p. Raising roof hatches, skylights and all roof top projections as required to 8" above finish roof, as a result of the work required to raise finished roof surfaces.
- q. Plumbing, mechanical or electrical modifications as required for completion of the installation.

C. Related Work/Requirements Specified Elsewhere:

- 1. Section 01020 - Allowances - where indicated.
- 2. Section 05300 - Steel Decking - for metal deck projects in furnishing acoustical rib insulation and the reattachment of the deck to meet the specified wind uplift requirements.
- 3. Section 06100 - Rough Carpentry - for wood nailers, cants, curbs and blocking.
- 4. Section 07600 - Flashing and Sheet Metal - for metal roof penetration flashings, flashings and counter flashings.
- 5. Section 07900 - Caulking and Sealants.

1.02 GENERAL

- A. The intention of this specification is to outline the entire roofing project, describing materials, methods, job conditions, etc., so that during the entire construction period, a complete watertight condition is maintained, and at completion, a new roofing system shall be installed.
- B. The Instructions to Bidders, the General Conditions of the Contract for the Construction for Buildings prepared by the American Institute of Architects, the Supplementary General Conditions, and the General Requirements are part of this specification whether bound herewith or not, and the Contractor shall refer to them for instruction pertaining to his work.

1.03 ALTERNATES

- A. Where so indicated the Contractor shall consult the "Bid Proposal Form" and read all alternates and assure him/herself whether or not they will add to, deduct from, or in any way affect the cost of the work under this section of the specifications. He/she shall include all such applicable alternates in his proposal.

1.04 REFERENCES

- A. General: References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards are deemed mandatory and applicable to the Work.
- B. ANSI/ASTM D41 - Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
- C. ANSI/ASTM D312 - Asphalt Used in Roofing.
- D. ANSI/ASTM D2178 - Asphalt Impregnated Glass Mat Used in Roofing and Waterproofing.
- E. Factory Mutual (FM) Engineering Corporation, Norwood, MA - Roof Assembly Classifications.
- F. 2020 International Building Code.
- G. FS HH-I-530 - Insulation Board, Thermal (Urethane).
- H. FS HH-I-551 - Insulation Block and Boards, Thermal (Cellular Glass).
- I. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.
- J. Underwriters Laboratories (UL), Northbrook, IL - Fire Hazard Classifications.
- K. Sheet Metal and Air-Conditioning Contractors National Association, Inc., Chantilly, VA (SMACNA).
- L. CGSB 37GP56M Classification: Type 2, Class C, Grade 1.
- M. American Society for Testing Materials (ASTM).
- N. Occupational Safety and Health Administration (OSHA), Washington, DC.
- O. Polyisocyanurate Insulation Manufacturers Association (PIMA) - Bethesda, Maryland - Average Weighted R-Values of roof insulation products.
- P. Single Ply Roofing Industry (SPRI), Waltham, MA - Wind Design Standard for Edge Systems Used in Low Slope Roofing Systems.

1.05 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 - "Terminology Relating To Roofing and Waterproofing"; glossary of NRCA's "The NRCA Roofing and Waterproofing Manual"; and the Roof Consultants Institute "Glossary of Roofing Terms" for definition of terms related to roofing work in this Section.

- B. Sheet Metal Terminology and Techniques: SMACNA Architectural Sheet Metal Manual.

1.06 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Jobsite Safety: Execute all operations and provide a safe work environment in accordance to OSHA standards and regulations. This requirement applies to all contractor personnel, associated subcontractors, workers in other trades, and jobsite visitors.
 - 1. Follow all industry fire prevention guidelines for storage of materials, staging areas, roof access, and application means and methods.
 - 2. Any applicable local fire codes supersede industry guidelines.
- D. Wind Loads: Provide a roof system, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of the 2020 International Building Code or the American Society of Building Engineers' ASCE7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever is more stringent. **Refer to drawings for Wind Design Data.**

Roofing System Design: Provide a roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7, for Exposure C based on a 120 mph three second gust at 40 feet with an importance factor of 1.15 on a steel deck with a fully adhered membrane. (C exposure requires a 105 lbs/sq. ft uplift pressure in the field of the roof and subsequent increases of 165 lbs/sq. ft at the perimeter and a 225 lbs/sq. ft in the corners)

- 1. Corner Uplift Pressure: 225 lbs/sq.ft.
 - 2. Perimeter Uplift Pressure: 160 lbf/sq.ft.
 - 3. Field-of-Roof Uplift Pressure: 105 lbf/sq.ft.
- E. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-105.
2. Hail Resistance: MH.

1.07 SYSTEM DESCRIPTION

- A. For the purposes of this specification, the roofing system has been based upon products manufactured by: *Johns-Manville Corp.*, *Soprema Roofing, Inc.*, and *Siplast Engineered Roof Systems*, or as approved equal by the Architect.
- B. Basic System Description:
 1. Tapered Insulation, Cover Board, Two-Ply S.B.S. Modified Bitumen Membrane System, utilizing a hot asphalt mopped base ply and a heat-welded top ply composition. Include all required pre-manufactured copings, gravel stops, and flashings and blocking as required, to provide complete roofing system warranty, whether detailed on the drawings or not.

1.08 SUBMITTALS

- A. Comply with the requirements of Section 01300 - Submissions, and as modified below. All submittals shall be submitted prior to the Pre-Installation Conference.
- B. Manufacturer's Product Data sheets and installation instructions on all materials proposed for use. This shall include catalogue sheets, specifications, and installation instructions for each material specified. Submit an intent to warrant, executed by an authorized representative of system manufacturer, indicating that the manufacturer has reviewed drawings, specifications and conditions affecting the work and, and proposes to provide warranties as referenced herein without further stipulation.
- C. Manufacturer's Warranty: Submit a sample copy of the membrane manufacturer's standard 20 year No Dollar Limit (NDL) roofing warranty, covering workmanship and materials.
- D. U.L., F.M. and S.P.R.I Compliance Data: Contact roofing manufacturer for information.
- E. Shop drawings indicating setting plan for tapered insulation. (Field verify exact location of drains prior to submittal.) Submit an accurate layout of the tapered insulation, designed and provided by the membrane manufacturer, showing all slopes to drains. Show cross section drawings illustrating the location and thickness of the tapered insulation pieces and filler pieces; show the thickness of the insulation system at high and low points.
 1. Where there is a proposed deviation from the Contract Documents, submit the revised detail labeled as such for approval. On the revised detail, show existing conditions and referenced directly to the related details on the Contract Drawings.

2. Submit an accurate layout of the wood nailers showing their required locations, and required spacing between nailers. Show the direction of the felt run in relation to the slope of the deck and the wood nailers.
- F. Samples: **All submitted samples must be labeled and supplied by the manufacturer for each submittal package. Submit:**
1. **(2)Two 12-inch square samples of roofing system plies illustrating the color and thickness to be used;**
 2. **(2)Two 12-inch samples of all proposed tapered insulation to be used;**
 3. **(2)Two 12-inch samples of all proposed cover boards to be used;**
 4. **(2)Two samples of each type of fastener proposed to be used.**
- G. Submit a copy of the **manufacturer's installation instructions.**
- H. Specified roof drain.
- I. Shop drawings indicating proposed configuration of perimeter blocking and fastening, if different than that as shown on the Contract Documents.
1. Complete configuration of existing roof indicating layout of membrane sheets, seams between sheets, and location and type of all roof penetrations.
 2. Complete details for attaching SBS system at perimeter of roof, flashing of roof penetrations, blocking configurations, and other special details as required. This shall include, but not be limited to pre-manufactured gravel stops and copings. Note: Field-fabricated gravel stops and copings will not be permitted.
 3. Complete layout of all tapered insulation indicating compliance with drainage patterns as shown on the drawings.
- J. Manufacturer's Data:
1. Roofing System:
 - a. **Submit six (6) copies of the manufacturer's product data, specifications, and installation instructions from the roofing system manufacturer.**
 - i. Submit transmittal form indicating that roofing system installer has received copies of manufacturer's installation instructions and recommendations.
 - b. **Submit list of at least ten (10) successfully completed roofing projects using each of the modified bitumen roofing systems proposed for use in this project.**

Include name, address, and telephone number of Owner's representatives. Identify square footage of total installation for each project listed.

- i. If the above list of completed projects was not installed by the applicator, submit an additional list of at least four completed modified bitumen-roofing projects installed by the applicator. Include name, address, and telephone number of Owner's representative.

2. Insulation:

- a. **Submit manufacturer's specifications and installation instructions for each type of insulation required.** Include data substantiating that the insulation complies with the requirements specified herein.

3. Certifications:

- a. All potential bidders shall submit notarized certification letters from the roofing manufacturer's main corporate offices indicating that the bidder has a minimum of five (5) years previous experience in the specific roofing system applications specified herein, and will provide a list of acknowledged projects to verify same.
- b. Submit certification that roofing systems installed as part of this project comply with the specifications and installation instructions of the roofing system manufacturer.
- c. Submit letter from roofing system manufacturer indicating that insulation has been approved by the roofing system manufacturer for use with the roofing system.
- d. Submit letter of certification from roofing manufacturer that the specified asphalt systems have been designed to satisfy the specified wind uplift criteria.
- e. Submit letter of certification from the Contractor's NYS certified Structural Engineer that the proposed blocking and fastening systems have been designed to satisfy the specified wind uplift criteria necessary to carry the specified roofing system warranty.

K. Shop Drawings:

1. **Submit six (6) complete sets of shop drawings that include the following information:**
 - a. Complete configuration of existing roof indicating layout of membrane sheets, seams between sheets, and location and type of all roof penetrations. Include

plans, elevations, sections, details and attachments to other work. Include and detail all base flashings, cants, and membrane terminations. Include tapered insulation layouts, including slopes. Include all crickets, saddles, and tapered edge strips, including slopes.

- b. Complete details for attaching membrane at perimeter of roof, flashing of roof penetrations, blocking configurations, and other special details as required. This shall include, but not be limited to pre-manufactured gravel stops and copings. Note: Field-fabricated gravel stops and copings will not be permitted.
- c. Complete layout of all tapered insulation indicating compliance with drainage patterns as shown on the drawings. Include all proposed insulation fastening patterns for review and approval.

L. Samples for Verification: for the following products:

- 1. **Manufacturer's standard sample size of smooth-surfaced roofing membrane sheet and flashing backer sheet.**
- 2. **Manufacturer's standard sample size of mineral-granule-surfaced roofing membrane cap sheet and flashing sheet.**
- 3. **Manufacturer's standard sample size of cover board.**
- 4. **Manufacturer's standard sample size of roof insulation.**
- 5. **Manufacturer's standard sample size of vapor retarder.**
- 6. **Manufacturer's standard sample size of substrate board.**
- 7. **Manufacturer's standard sample size of walkway pad or cap sheet walkway.**
- 8. **Six fasteners or each type, length and finish used for complete roofing installation.**

M. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

N. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

- 1. Submit evidence of meeting performance requirements.

O. Qualification Data: For Installer and Manufacturer.

- P. Product Test Reports: Based on evaluation of comprehensive tests performed by the manufacturer and witnessed by a qualified testing agency, for all components of roofing system.
- Q. Research / Evaluation Reports: For components of roofing system.
- R. Maintenance Data: Refer to manufacturer's latest published bituminous binder.
- S. Warranties: Provide special warranties specified in this Section.

1.09 QUALIFICATIONS

A. Applicator's Qualifications:

1. Roofing applicator must be approved by the manufacturer prior to the bidding period and throughout the installation and able to present a copy of his certification as a part of the bid qualifications package required by this contract. This certification must be an original document as prepared directly by the manufacturer's corporate offices, specific for this contract. Submit certifications from manufacturer as per above.
2. Roofing applicator must have installed and successfully completed at least (10) ten roofs of the same materials and methods specified for this project, completed over the last five years. Submit certifications from manufacturer pursuant to 1.06-J-3b above. (List last ten such jobs within 50 miles of the job site, including address, type of system and number of plies, if applicable, square footage, date installed and owner/agent with whom contracted)
3. The selected bidder must be a single firm specializing in the types of roofing required, providing undivided responsibility for the performance of all component parts of the roofing system.
4. The contractor must be approved by the roofing system manufacturer for the installation of the primary roofing materials indicated, including membrane and flashing, and his firm must be in continuous operation of installing such roofing systems for two years or more. Include certifications required.
5. The contractor must have at least five (5) years of manufacturer-certified experience in installing commercial scale modified bitumen roofing systems as required by this specification.
6. The contractor must employ roofing application foremen who have successfully completed all training offered by roofing systems manufacturer, including schools, seminars, etc. Provide a letter certifying that the job foreman or crew chief and at least one other member of the roofing crew have installed at least similar systems and are thoroughly

familiar with all aspects of the installation. Installation of a minimum of five roofs of comparable size, scope, and complexity as the Work of this Section of roofing system specified in the Contract Documents, for which this individual served as field foreman in direct, responsible charge of all roofing work crews. (List last five such jobs within 50 miles of the job site, including address, type of system and number of plies, if applicable, square footage, date installed and owner/agent with whom contracted).

7. Should the successful contractor opt to utilize the services of a subcontractor for any installations under this contract, the subcontractor shall also meet all requirements of experience and qualifications listed herein required for the Prime Contractor. Note: No more than 25% of the required installations shall be made by manufacturer-certified subcontractors to the Prime Contractor, in conformance with the Instructions to Bidders section of the Project Manual.
8. Roofing application foremen who have successfully completed all training offered by roofing system manufacturer, including schools, seminars, etc. On roofs utilizing torch-application, prior to the installation, the contractor shall submit documentation that his staff carries current certifications to conduct torch-welded activities, with documentation stating same from the Roofing Educators Institute.
9. Contractor's Required Closeout Submittals: The Contractor shall submit a final invoice for the project, as well as close-out of any and all open change orders. He shall include all final waivers of liens from all material suppliers and subcontractors. (Refer to Section 01700 for additional information.) Provide a completed punch list certification by the Contractor and the Owner's Representative.

B. Manufacturer's Qualifications:

1. The roofing system manufacturer must have a minimum of 10 years experience in the manufacture of SBS modified bitumen roofing membranes.
2. For the work of this contract, the roofing system manufacturer must provide a factory-trained and factory-authorized field representative/technician, employed by the roofing system manufacturer, to supervise each project site via a minimum of 8 onsite visits, and to review installation procedures and advise applicator on procedures and precautions in use of roofing materials required for final inspection of the roofing system. The cost of this manufacturer's representative, and costs incurred for the supply of same, shall be considered inclusive within the contractor's Base Bid for this project. No exceptions will be made for this requirement. Work shall not begin on this project until this representative has arrived to the project, inspected it, and authorized for work to start. The manufacturer's

representative shall sign-in upon each visit with the Construction Manager (or designated Owner's Representative), so that accurate attendance records can be kept. The intent of the site visits is that the manufacturer's representative will ensure the quality of the preparation and application of the roof system. The representative will inspect the project on a periodic basis to anticipate problems before they occur answer questions quickly and look out for the best interest of the Owner. The manufacturer's representative will issue a written inspection report for each visit to be issued to the Owners Representative, Architect & Contractor. The report shall include name of factory authorized field representative; building name; date of visit; weather condition; conformance or non-conformance of installation of roofing materials as per specifications; directions given if any to correct non-conformance issues.

3. The roofing system manufacturer must provide a No-Dollar-Limit (NDL) full systems warranty (See paragraph 1.15-"Warranty and Guarantees") upon satisfactory installation of the roofing system.
4. All roofing work, including terminations and other work covered under the roofing manufacturer's Total System Guarantee shall be performed by the Prime Contractor. No subcontractors will be permitted on this portion of the work.

1.10 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for roof assembly fire hazard requirements.
- B. Factory Mutual Global Engineering and Research Corporation (FMG):
 1. Roof assembly classification of Class 1 Construction, wind uplift requirements of FMG 1-105 in accordance with FM Construction Bulletin 1-28.
 - a. **Wind Uplift Certification:** Submit written certification that the roof system, including the specific insulation, adhesives and/or fasteners, have been tested in conjunction with the type of structural roof deck applicable to Factory Mutual Global (FMG) tested decks and this project, and has achieved a Factory Mutual Class I-105 Wind Uplift rating. (Except where slope and deck types exceeds FM limits.) In these cases installation will be as per the written specification and to meet the Manufacturer's requirements for the designated wind speed in section 1.06 D.
 - b. Certification: Letter from Factory Mutual, or a copy of the Factory Mutual Approval Report for the roofing system.
 2. All products shall be listed as Factory Mutual-certified a minimum of one (1) year prior to the date of installation.

Submit certifications for both base and top plies as a part of the submittals required for this project.

3. Material Certification: Written certification from the roofing manufacturer certifying that the insulation, insulation fasteners, flashings and accessory products provided by the roofing manufacturer are approved for use with the roofing system and are included in the 20-year No Dollar Limit warranty.
4. Contact roofing manufacturer's technical representative for additional information.

C. Underwriters Laboratories, Inc. (UL):

1. Class A Fire Hazard Classification.

D. Insulation Criteria:

1. Polyisocyanurate foam insulation shall bear a label certifying that a thermal value was determined in accordance with ASTM C-1289-01.
2. Insulation supplied shall be acceptable to the membrane manufacturer.
3. Polyisocyanurate foam insulation shall bear a label certifying that it meets NFPA 276 or UL 1256.

E. ANSI/SPRI Wind Design Standard for Edge Systems Used in Low Slope Roofs - All roof edge systems shall comply with the requirements of ANSI/SPRI System Requirement ES1-98 Wind Design Standards Test RE-3. The Contractor shall supply written confirmation of this compliance stating that the roof edge system materials:

1. Exceed 75 lbs./lf outward load in accordance with ANSI/SPRI ES1-98 Wind Design Standards Test Method RE-3; and
2. Exceed 120 lbs./lf upward load in accordance with ANSI/SPRI ES1-98 Wind Design Standards Test Method RE-3.

1.11 PRELIMINARY / PRE-INSTALLATION ROOFING CONFERENCE

A. Convene prior to commencing work of this section at a time and location to be determined by the Owner or Owner's Representative.

1. All parties responsible for work of this section are required to attend including the Architect, Owner, Contractor, and any other trades involved in the roofing work.

B. The agenda for the pre-roofing conference shall include:

1. Meet with Owner, Architect, Owner's insurer (if applicable), testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck installer, and installers whose work interfaces with or

affects roofing including installers of roof accessories and roof-mounted equipment.

2. Review of all systems and materials to be used in the installation of new roofing, installation procedures and coordination required with related work. Review means, methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and coordination of all substrate preparation and related work, including installation of curbs or similar items by others. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening. Review structural loading limitations of roof deck during and after roofing operations.
4. Review and modify roofing applicators proposed sequencing of the work; review trade coordination necessary for job completion.
5. Inspect and make notes of job conditions prior to installation. Examine site for approved staging areas, disposal sites, and document existing conditions prior to contractor mobilization. Establish scope of work for site restoration and responsibilities.
6. Supply to the Owner's Representative, a letter from the corporate offices of the roofing manufacturer, which states the name, title, address and phone number of the factory-supplied representative(s) who will be assigned to this project. No exceptions will be made for this item.
7. Review Contractor's Project Safety Plan for site conditions, enforcement, compliance, or Owner-imposed restrictions that may be required.
8. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
9. Examine site for condition and completion of areas adjacent to work area. Establish protection required for existing surfaces.
10. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
11. Review governing regulations and requirements for insurance and certificates if applicable.
12. Review temporary protection requirements for roofing system during and after installation.
13. Review work limitation by contractor including; start times, end times, days of the week, noise mitigation, fume control

and any part of the work that would affect normal building operations.

14. Review roof observation and repair procedures after roofing installation.

1.12 DELIVERY, STORAGE, HANDLING AND DISPOSAL

- A. Deliver all materials and store in their unopened original packaging and rolls with labels intact and legible, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard. Allow no unlabeled materials on site. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight. Directions for all storage shall be included from the manufacturer.
- B. Protect materials during delivery to the site. Keep materials in safe, dry storage at temperatures recommended by their manufacturers. Materials shall be labeled for ready identification, Label shall include name of manufacturer.
- C. Deliver materials requiring fire resistance classification to the job with labels attached and packaged as required by labeling service. Deliver materials in sufficient quantity to allow continuity of work.
- D. Storage and Handling: Store materials in a dry, well-ventilated place protected from the weather.
 1. Do not store materials so as to overload the deck or structural assembly; do not stockpile aggregate surfacing materials on roof. Prepare staging for aggregate stockpile that will prevent contamination of the material.
 2. Store all materials on 4" min raised platforms covered with properly secured breathable water resistant covers. Slit shrink wrapping to not permit condensation and cover with breathable tarp.
 3. Mark for clear and evident identification all materials that have been subject to moisture. Remove all materials that become wet from the site.
 4. Store volatile liquids in a separate storage building or trailer, or remove from the site at the end of each workday.
 - a. Store volatile liquids at temperatures recommended by the manufacturer.
 5. Do not remove materials from factory packaging until ready for use. Handle roll goods with care; do not use roll goods which have been damaged.

6. Store adhesives and sealants at temperatures between 60°F and 80°F.
- E. Handle rolled goods so as to prevent damage to edge or ends.
- F. Select and operate material handling equipment so as not to damage existing construction or applied roofing. Handle and store all roofing materials and place equipment in a manner to avoid any permanent deflection of deck. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.
- G. Store insulation, roofing, and related materials on clean, raised platforms (min. 4" above ground level) in weather protective, "non-sweating" coverings when stored outdoors. Properly tie down insulation to prevent blow off. No materials shall be stored on any roof surface(s). Do not store any flammables on the roof.
- H. Store rolled goods on end.
- I. Provide continuous protection of materials against wetting and moisture absorption. Store materials a minimum of 6" off the ground, in a dry, well ventilated place protected from the weather. Enclosed trailers are recommended. Heated or Air-Conditioned storage is required for temperature-sensitive items.
- J. Protect materials against damage by construction traffic.
- K. Remove wet materials from project site; discard and legally dispose of all liquid material that cannot be applied within its stated shelf life.
- L. Comply with fire and safety regulations.
- M. Store emulsions in temperature above 40°F.
- N. Protect membrane and flashing materials against coming in contact with coat tar pitch, petroleum, grease, oil, solvents, or other waste products. After exposure to pitch or other waste products, remove contaminated membrane and flashing material from site.
- O. Store adhesives, flashing material, splice wash, and sealant in a secure, well-ventilated, watertight place. Do not leave unused materials on the roof overnight or when roofing work is not in progress. Only materials to be used the same day shall be removed from this location. During winter, store materials in a heated location with a 50°F minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.
- P. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store all materials in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- Q. Disposal: All removed materials become the property of the Contractor. Inspect all ground areas surrounding roof on a daily

basis for loose debris; immediately move all debris off the roof and into approved dumpsters, ready for legal disposal off-site. Dumpster staging areas must be kept neat and tidy; do not allow to overflow. All debris must be transported to a legal dumpsite or recycling facility, and documentation of each load must be maintained by the Contractor.

1.13 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty prior to bid.
- B. Manufacturer Qualifications: A qualified manufacturer that has UL listing and a FMG approval for roofing system identical to that used for this Project.
- C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- D. Submit certification by the manufacturer of the system materials used that these specifications and drawing details are acceptable to them for the deck and surfacing to which they are to be applied.
 - 1. If details for any manufacturer's system proposed in the Contract Documents are not acceptable to the manufacturer, submit corresponding details proposed for the particular application, together with the manufacturer's reasons for not accepting the conditions depicted in the specifications or drawings. No alternate details will be considered without evidence of valid objections on the part of the manufacturer to the contract requirements.
 - 2. No deviation is to be made from this specification without prior written approval by the manufacturer; submit such approval to the Architect.
 - 3. The roofing system manufacturer must provide inspection of guaranteed roofing systems by company employed, salaried personnel dedicated to Technical Services. Sales representatives or sales agents will not be permitted to conduct quality assurance inspections or grant final manufacturers acceptance.
 - 4. The Contractor shall submit written certification from the roofing membrane manufacturer certifying that the proposed roofing assembly, compatibility of materials and total R-Value of the insulation system meet or exceed these specification requirements. Letter shall state that the specifications and drawing details are acceptable to them for the deck and surfacing to which they are to be applied, that there is a compatibility of all materials provided, and the total R-value of the proposed insulation system. Membrane manufacturer shall also submit a letter certifying that the manufacturer has been

actively marketing the submitted system for a minimum of five (5) years.

- E. Modified Bitumen Roofing Applicator Requirements: refer to 1.09A of this Section.
- F. Modified Bitumen Roofing Manufacturer Requirements: refer to 1.09B of this Section.
- G. Material Requirements / Source Limitations:
 - 1. Obtain all membrane sheets, flashings, prefabricated gravel stops and copings, all temporary roof materials and all surface coatings from a single manufacturer.
- H. **UL Rating:**
 - 1. Provide modified bitumen membrane and insulation that has been classified by Underwriters Laboratories as a component of Class A roofing system.
- I. **Wind Uplift:**
 - 1. **Design adhered roofing systems and blocking configurations and attachments are to meet Factory Mutual Zone 4 wind uplift criteria (Factory Mutual Systems Loss Prevention Data Sheet 1-28). Refer to Article 1.10 of this Section.**
- J. **Inspection:** Prior to, during installation, and at completion of the installation, an inspection shall be made by a representative of the manufacturer in order to ascertain that the roofing system has been installed according to their published specifications, standards, and details.
 - 1. Warranty will be issued upon approval of the installation by the roofing manufacturer.
- K. Test Reports: Provide:
 - 1. **Roof drain and leader test or submit plumber's certification. Contractor to provide core cuts, if requested to verify.**
 - 2. **Roof deck fastener or two part urethane insulation adhesive pull-out tests. It is the responsibility of the successful contractor to initiate and make roof cuts for the appropriate Urethane manufacture/s and provide the Architect with the Tested Results two weeks before starting work.**
- L. **Fire-Test-Response Characteristics:** Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-test Exposure: Class A; ASTM E108, for application and roof slopes indicated.
- M. **Fire-Resistance Ratings:** ASTM E119, for fire-resistance-rated roof assemblies of which roofing system is a part.

1.14 JOB CONDITIONS

- A. Surfaces on which the roofing membrane system is to be applied shall be clean, smooth, dry, and free of fins, sharp edges, loose and foreign materials, oil and grease.
1. Before beginning work, the authorized representative of the manufacturer shall examine the roof surfaces in order to ensure that all substrates are acceptable, and will ensure the Total System / No Dollar Limit Warranty requirements of this contract.
- B. Examine the substrate and the conditions under which roofing work is to be performed, and notify the Architect in writing of unsatisfactory conditions. The Contractor will schedule a coordinated field meeting with the Architect and the authorized manufacturer's representative to review said conditions prior to proceeding with the work. Do not proceed with any work until all unsatisfactory conditions have been corrected.
1. All surface voids greater than 1/4" wide (or limitations as recommended by the roofing manufacturer) shall be properly filled with an acceptable fill material.
- C. Environmental Requirements / Conditions:
1. **Do not smoke or use open flames except for installation of thermally fused (torched) roofing products.**
 2. **Do not apply insulation or roofing materials during rainstorms.**
 3. **Do not apply roofing sheets when wind conditions are such that it becomes difficult to handle roofing sheets.**
 4. **Proceed with roofing work only when existing and forecasted weather conditions are in compliance with manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with requirements and the manufacturer's recommendations.**
 5. **Do not start roofing if rain is imminent, or ambient temperature is below 40 degrees F.**
 6. **If rain occurs during roof membrane application, cease operations and protect deck, insulation, penetrations and membrane from water damage and intrusion.**

7. **Comply with all fire regulations. Ensure properly rated, charged and inspected fire extinguishers are on the roof and at staging areas.**
- D. **Limit removal of existing roofing to the amount (or areas) that can be replaced with completely watertight roofing system and related work in a single working day, maintaining a completely watertight covering on the roof.**
1. At the end of each work day, or when weather conditions outside manufacturer's recommended limits are predicted, provide and install temporary water-stops as recommended by the roofing manufacturer.
 - a. Permanent roof insulation shall not be installed as base for temporary water-stops.
 - b. Remove temporary water-stops completely before installing permanent roofing system.
 - c. Cover, seal or otherwise protect the roof and flashings so that water cannot accumulate or flow under completed portions. When and where necessary to accomplish this, provide temporary water cut-offs in accordance with the membrane manufacturer's written specifications.
- E. **Protection:**
1. Take necessary precautions to prevent damage of any kind to adjacent material and work for other trades.
 2. Provide protection to prevent damage or staining of building surfaces, paved areas and plantings.
 3. Provide enclosed chutes for removing debris from roof level, to roof level and to vehicles below. Do not throw debris from roof level.
 4. Protect areas of deck repair at the end of each working day. Protection shall be watertight.
 5. Provide and maintain operating water pumps on each roof area to keep areas free of water accumulation. Pump water through hoses of sufficient size to functioning roof drains.
 6. **Drain Verification:**
 - a. **Prior to start of roofing removals, in the presence of the Owner's representative, verify that existing roof drains are operational and are not plugged.**
 - b. **Submit in writing that the verification of roof drains has been performed. Include listing and location of non-operational drains.**

- A. **Manufacturer's Guarantee:** Upon completion of the work, furnish to the Owner via the Prime Contractor the manufacturer's written and signed Full System Warranty (similar or equal to *JM Peak Advantage 20-Year No Dollar Limit [NDL] Roofing System Guarantee*) certifying the performance of his products and the consistency of the properties of such products affecting their performance for a period of twenty (20) years from the date of acceptance by the Architect, and that installation of the product is in accordance with manufacturer's requirements. The Full System / No Dollar Limit Warranty shall be accompanied by a letter from the manufacturer's corporate office, attesting that the entire roofing installation was inspected during the complete course of the project by the factory-authorized representative, who shall be named, and that the entire installation is certified compliant to the manufacturer, and worthy of the required warranty.
1. The full system warranty shall include, but not be limited to the following conditions:
 - a. Cracking due to expansion or contraction of the membrane.
 - b. Deterioration due to exposure to the elements.
 - c. Decomposition of membrane due to ponding water.
 - d. Separation of factory and field fabricated seams and joints.
 - e. Cracking or deterioration of membrane materials from trapped water vapor under membrane.
 - f. Separation of or decomposition of membrane flashing.
 - g. Warranty shall include a **120 mph three-second Wind Rider as required by ASCE-7.**
 - h. All Decks utilizing 2 Part UIA must have Adhesive Strength Test performed by OMG Fasteners and/or Royal Adhesives, the results to accompany the Pre Installation Notice to the manufacturer of the roofing membrane, two weeks before the start of the actual roof replacement.
 2. Single-Source special warranty includes: roofing membrane, base flashings, liquid applied flashing, roofing membrane accessories, roof insulation, fasteners, cover board, substrate board (where indicated), vapor barrier (where indicated), walkway products, manufacturer's expansion joints, membrane manufacturer's edge metal products (Edge to Edge), and other single-source components of roofing system marketed by the manufacturer.
 - a. Guarantee shall include repair damage to roofing system caused by winds **up to and including three second gust**

of 120 MPH, 33 feet off the ground as defined by the Beaufort scale.

3. The specifications may require more than what the manufacturer may require for providing a warranty for the roofing system.
 4. Provide that in the event the roofing system fails to perform, the roofing systems manufacturer will, at its own expense, cause to be made the repairs or modifications to the roofing system necessary to affect water tightness and will re-inspect the roof and re-issue the guarantee after re-inspection.
 5. In the event repairs are required due to natural disasters, unauthorized alterations, or other causes specifically excluded in the guarantee, the manufacturer will re-inspect the roof and re-issue the guarantee provided that the methods and materials used in the repair have received prior approval by the manufacturer and the repairs are accomplished by an approved applicator.
 6. The manufacturer shall inspect the roof area under this contract every five (5) years of the duration of the warranty period and will provide written observation and associated specific maintenance recommendations, as applicable, to the Owner.
- B. **Installer's Guarantee: Submit roofing Installer's warranty, on warranty form from manufacturer, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period: Two (2) years from date of Substantial Completion.**
- C. The Contractor is to cover damages to the building resulting from failure to prevent penetration of water during construction.
- D. **Contractor's Guarantee: Furnish contractor's guarantee in accordance with Section 01700 for all materials and workmanship starting from date of Substantial Completion. Replace defective roofing at no expense to the Owner.**
- E. The manufacturer shall have a minimum AAA credit rating; provide written verification of same to the Architect as a part of the submittals for this project.

1.16 LABORATORY TESTING

- A. Upon request from the Owner or Architect, the roofing membrane manufacturers shall supply, at their expense, the results of mechanical and chemical testing performed on the elastomeric asphalt materials supplied.
- B. The tests shall be performed to certify compliance with the standards referenced under this section.

1.17 SITE PROTECTION

- A. During roofing work, exposed surfaces of finished walls and ground shall be protected with tarps in order to prevent damage. Contractor shall assume full responsibility for any damage.
- B. All work relative to this roof project shall include the use and installation of temporary partitions as necessary and required to adequately satisfy the needs for the separation of construction requirements of Section 01050.

PART 2 - PRODUCTS

2.01 GENERAL

- A. For the purposes of this specification, and to identify a minimum level of quality, the design is based on the use of either:
 - 1. ***Johns Manville Roofing Systems, Inc.***
717 17th Street,
Denver, CO 80202
 - 2. ***Soprema Roofing and Waterproofing, Inc.***
310 Quadral Drive
Wadsworth, Ohio 44281
 - 3. ***Siplast Engineered Roof Systems***
1000 East Rochelle Blvd.
Irving, Texas 75062
 - 4. An **approved equal** by the Architect.
- B. **Such references shall be construed only as establishing the quality of materials and workmanship to be used under this section, and shall not, in any way, be construed as limiting competition by other manufacturers offering products of identical material composition. Products used shall be those upon which the design is based, or shall be equal products, approved in advance, by the Architect.**
- C. **Bidders / Applicators seeking approval for substitute materials shall submit their request in writing to the Architect in accordance with the requirements of the Project Manual.**

2.02 VAPOR BARRIER ON WOOD DECKS AND STEEL AND CEMENTITIOUS WOOD FIBER (TECTUM) DECKS WITH SUBSTRATE BOARD

- A. Tri-laminate woven polyethylene, nonslip, UV-protected top surface, with a SBS Rubber and asphalt blend with low air and vapor permeability. Basis of Design: JM Vapor Barrier SA
- B. Primer: JM SA Primer Low VOC

2.03 VAPOR BARRIER ON CONCRETE, LIGHTWEIGHT CONCRETE AND GYPSUM DECKS

- A. SBS Membrane Vapor Barrier: Thermally fused, Fiber-glass reinforced, SBS modified asphalt sheet; smooth surfaced; suitable for application method specified; Johns Manville DynaWeld Base, or approved equal by the Architect. Product shall conform to the requirements of ASTM D 6163, Type I, Grade S.
1. Description: *DynaWeld Base* is composed of selected SBS modified bitumen applied onto a fiber-glass mat with a sanded underside and high brush sanded topside surface. Nominal thickness - 114 mils.
 2. Physical Properties:
 - a. Minimum Thickness: 118 mil (3.0 mm), minimum.
 - b. Tensile Strength @ 0°F (-18°C):
 - i. Machine Direction: 130 lbs. force/in. width (18.4 kN/m), Minimum.
 - ii. Cross Machine Direction: 100 lbs. force/in. width (16.6 kN/m), Minimum.
 - c. Elongation @ 0°F (-18°C):
 - i. Machine Direction: 5%
 - ii. Cross Machine Direction: 5%
 - d. Tensile-Tear:
 - i. Machine Direction: 105 lbs. force/in. width (17.5 kN/m), Minimum.
 - ii. Cross Machine Direction: 80 lbs. force/in. width (15.75 kN/m), Minimum.
 - e. Low Temperature Flexibility: -30°F (-34°C).
 - f. Dimensional Stability:
 - i. Machine Direction: 0.1% change.
 - ii. Cross Machine Direction: 0.1% change.
- B. Primer: JM Asphalt Primer

2.04 MEMBRANES

- A. **SBS Membrane Base Ply on all deck types:** Polyester reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified; Johns Manville *DynaLastic 180*, *Soprema Elastophene 180PS*, *Siplast Paradene 20 PR* or approved equal by the Architect. Product shall conform to the requirements of ASTM D 6164, Grade S, Type I.
1. Description: Waterproofing membrane shall have non-woven polyester reinforcement and thermo-fusible elastomeric

asphalt. This membrane is to be applied by on steel and wood decks only.

2. Components: Reinforcement shall be non-woven polyester. Elastomeric asphalt shall be a mix of selected bitumen and SBS thermoplastic polymer material, meeting ASTM D6164, Type I.
3. Physical Properties: ASTM Test Method D5147.
 - a. Thickness: 150 mils (4.0 mm), minimum.
 - b. Tensile Strength @ 0°F (-18°C):
 - i. Machine Direction: 110 lbs. force/in. width (19.3 kN/m), Minimum.
 - ii. Cross Machine Direction: 90 lbs. force/in. width (15.8 kN/m), Minimum.
 - c. Elongation @ 0°F (-18°C):
 - i. Machine Direction: 35%
 - ii. Cross Machine Direction: 40%
 - d. Tensile-Tear:
 - i. Machine Direction: 125 lbs. force/in. width (17.5 kN/m), minimum.
 - ii. Cross Machine Direction: 90 lbs. force/in. width (15.75 kN/m), minimum.
 - e. Low Temperature Flexibility: -20°F (-29°C).
 - f. Dimensional Stability:
 - i. Machine Direction: 0.2% change.
 - ii. Cross Machine Direction: 0.1% change.

- B. **SBS Membrane Top Ply / Cap Sheet:** SBS-modified asphalt, non-woven polyester mat sheet; granular surfaced; suitable for application method specified. *Johns Manville DynaWeld Cap 250 FR, Soprema Sopralene Flam 250 FR GR, Siplast Paradene 40FRTG* or approved equal by the Architect. Product shall conform to the requirements of ASTM D 6164 G.

1. Description: Roofing membrane shall have non-woven polyester reinforcement and thermo-fusible elastomeric asphalt. The topside shall be self-protected with colored granules. This membrane is to be applied by heat welding. Material shall meet or exceed the criteria for ASTM D6164, Type II, and Grade G.

- a. Color to be selected by the Architect.
- 2. Components: Reinforcement shall be non-woven polyester. Elastomeric asphalt shall be a mix of selected bitumen and SBS thermoplastic polymer. Materials shall meet or exceed the criteria for ASTM D6164, Type II, and Grade G.
- 3. Physical Properties:
 - a. Thickness: 165 mil (4.06 mm).
 - b. Tensile Strength @ 0°F (-18°C):
 - i. Machine Direction: 184 lbs. force/in. width (32.2 kN/m).
 - ii. Cross Machine Direction: 122 lbs. force/in. width (21.4 kN/m).
 - c. Elongation @ 0°F (-18°C):
 - i. Machine Direction: 45%.
 - ii. Cross Machine Direction: 54%.
 - d. Tensile-Tear:
 - i. Machine Direction: 181 lbf. (805 N).
 - ii. Cross Machine Direction: 124 lbf. (122 550 N).
 - e. Low Temperature Flexibility: No cracking to -10°F (-23°C).
 - f. Dimensional Stability:
 - i. Machine Direction: 0.3% change.
 - ii. Cross Machine Direction: 0.1% change.
- C. **Base Ply Flashing:** *JM DynaWeld Base, Soprema Sopralene Flam 180, Siplast Paradene 20TG* or approved equal by the Architect.
 - 1. Descriptions: Backer Sheet shall conform to requirements of ASTM D6163, Grade S, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet, smooth surfaced, suitable for application method specified.
 - 2. Components: Reinforcement shall be non-woven polyester. Elastomeric asphalt shall be a mix of selected bitumen and SBS thermoplastic polymer.
 - 3. Physical Properties:
 - a. Thickness: 0.118 inches (3.0 mm).

- b. Tensile Strength @ 0°F (-18°C):
 - i. Machine Direction: 130 lbs. force/in. width (22.8 kN/m).
 - ii. Cross Machine Direction: 100 lbs. force/in. width (17.5 kN/m).
- c. Elongation @ 0°F (-18°C):
 - i. Machine Direction: 5.0 percent.
 - ii. Cross Machine Direction: 5.0 percent.
- d. Tensile-Tear:
 - i. Machine Direction: 105 lbs. /in. (487 N).
 - ii. Cross Machine Direction: 80 lbs. /in. (356 N).
- e. Low Temperature Flexibility: -10°F (-21°C).
- f. Dimensional Stability:
 - i. Machine Direction: 0.20% change.
 - ii. Cross Machine Direction: 0.20% change.

D. **Cap Membrane Flashing Ply:** *JM DynaWeld 250 FR, Soprema Sopralene Flam 250 Granules, Siplast Parafor 50LT*, or approved equal by the Architect. Flashing Sheet shall conform to ASTM D6164, Grade G, Type II, polyester-reinforced SBS-modified asphalt sheet; granular surfaced, suitable for application method specified, similar or equal to *JM DynaWeld 250 FR*, or as approved by the accepted roofing manufacturer.

1. Description: Cap membrane flashing shall have a non-woven polyester reinforcement and thermo-fusible elastomeric asphalt. The topside shall be self-protected with colored granules.
 - a. Granule color to be selected by the Architect.
2. Components: Reinforcement shall be non-woven polyester. Elastomeric asphalt shall be a mix of selected bitumen and SBS thermoplastic polymer, meeting ASTM D6164, Grade G, Type II.
3. Physical Properties:
 - a. Thickness: 0.165 inches (4.2 mm).
 - b. Tensile Strength @ 0°F (-18°C):
 - i. Machine Direction: 184 lbs. force/in. width (32.2 kN/m).
 - ii. Cross Machine Direction: 122 lbs. force/in. width (21.4 kN/m).

- c. Elongation @ 0°F (-18°C):
 - i. Machine Direction: 46 percent.
 - ii. Cross Machine Direction: 54 percent.
- d. Tensile-Tear:
 - i. Machine Direction: 181 lbf. (805 M).
 - ii. Cross Machine Direction: 124 lbf. (17.5 kN/m).
- e. Low Temperature Flexibility: -10°F (-23°C).
- f. Dimensional Stability:
 - i. Machine Direction: 0.3% change.
 - ii. Cross Machine Direction: 0.10% change.

E. **Liquid Applied Flashing:** A liquid and fabric reinforced flashing system created with a stitch-bonded polyester scrim and a two-component, moisture-cured, elastomeric, liquid-applied flashing material, consisting of an asphalt extended urethane base material and an activator; similar or equal to *JM PermaFlash System*.

2.05 FASTENERS

- A. Fastener Types by Substrate:
 - 1. **Wood:** Roofing nails of galvanized steel, long enough to penetrate the wood by at least 3/4-inch on flashings and parapet walls.
 - 2. **Masonry:** Nail-in expansion type device with zinc body, plated steel nail, and mushroom head, and long enough to embed into the masonry a minimum of 1-inch.
 - 3. **Purlin Fasteners for all Cementitious Wood Fiber (CWF) Decks:** Mechanical fasteners for re-securement of the CWF to the Bar Joist of all the CWF decks shall be JM RetroDrillers.
 - 4. **Insulation on Steel decks:** Mechanical fasteners for securement of insulation to steel decks shall be approved by the insulation manufacturer for the system specified but not less than a #12 fastener. Base of Design: JM UltraFast Fasteners and a Flat bottom plate.
- B. The same brand fastener is to be used throughout the work.
- C. Number of fasteners and layout will be as recommended by the manufacturer and as per FM Approval Guide for 1-105 wind uplift.
- D. Length of fastener shall be determined by the thickness of the decking and any fill, and will vary with the thickness of the insulation. Fasteners shall be of appropriate length to achieve an embedment of 1-inch for Steel decks and 2" for Cementitious Wood

Fiber Decks. Where applicable, all fasteners must pass through steel decking, through top flutes ONLY. Where underside of decking is exposed as finished space, fasteners shall not be permitted, and the system manufacturer will provide alternate attachment means in order to maintain required full system warranty and wind uplift requirements. Fasteners shall meet the deck pullout resistant requirements of FM 1-105 for wind uplift.

E. Insulation Fasteners and Two Part Urethane Insulation Adhesive on Cementitious Wood Fiber Decks:

1. **JM Polymer Auger Fasteners to be used along with Two Part Urethane Insulation Adhesive on the base layer of insulation on all Cementitious Wood Fiber Decks.**
2. Urethane Adhesive: Manufacturer's two component urethane adhesive formulated to adhere insulation to substrate and or to other insulation. Basis of Design: JM Two-Part Urethane Insulation Adhesive.

2.06 WOOD BLOCKING, PLYWOOD AND CANTS

- A. All nailers and blocking material, plywood and cants to be free of wane, shake, decay or checks, and pressure treated with water-borne preservatives for above ground use, AWPB LP-2. Standard and kiln dried to a maximum of 19 percent moisture content. Wood shall be dressed on all sides. Treat on all surfaces, including field cuts.
1. Blocking shall be not less than Construction Grade, Southern Pine, and shall conform to the current JM and NRCA recommendations on wood nailers as well as conform to the FM Global Loss Prevention Data Sheet 1-49. Creosote and asphaltic preservatives are not acceptable. Blocking thickness shall be size as indicated or required to bring the blocking flush with the top surface of insulation and tapered edge strips.
 2. The contractor shall provide and install multi-ply blocking along roof edges and at roof penetrations as required to bring wood blocking flush with top surface of insulation and tapered edge strips. The contractor shall refer to tapered insulation drawings issued with the bid package which indicate total insulation thickness at roof edges and at roof penetrations.
- B. **In order to provide minimum tapered insulation profiles as necessary, the Contractor may need to provide alternate perimeter blocking (and fastening) details, based on verified field conditions. The cost of any field modifications required shall be at no additional cost to the Owner. All blocking attachments shall be certified by a NYS-licensed Professional Engineer (who is retained by the Contractor on a consultant basis) certifying that the connections as designed meet or exceed the wind uplift requirements of the roofing system.**
- C. Install plywood on all masonry surfaces contaminated with asphalt or coal tar.

2.07 INSULATION ON STRUCTURAL SLOPED AREAS / TAPERED INSULATION ON FLAT ROOFS

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. **Flat insulation:** shall be of rigid type, closed-cell polyisocyanurate foam core bonded in the foaming process to universal fiberglass reinforced facers, as manufactured by *Johns Manville ENRGY 3*, Denver, Colorado, *Atlas Roofing Products*, Atlanta, Georgia, or equal acceptable to the membrane manufacturer for the system specified. Product shall conform to the requirements of ASTM C 1289, Type II, Grade 2.
- C. Typical Physical Properties:
1. ASTM C 1289-01 Type II, Class I, Grade 3 and CAN/ULC S 704
 2. ASTM C 209, Water Absorption: <1.5% (maximum)
 3. ASTM D 2126, Dimensional Stability Change: <2%
 4. ASTM D 1621, Compression Resistance (10% Consolidation): 20 psi (172 kPa) min.
 5. ASTM E 96, Moisture Vapor Permeance: <1 perm (57.ng/(Pa•s•m²))
 6. Service Temperature: 100° to 200°F (-73° to 93°C)
 7. ASTM D 1623, Tensile Strength: 730 psf (35 kPa) nom.
 8. NFPA 276 or UL 1256 Thermal Barrier Compliance.
- D. **Provide insulation on sloped roofs with R Value greater than 30 in two (2) layers of 2.6 inch.**
- E. **Tapered Insulation:** shall be of rigid type, closed-cell polyisocyanurate foam core bonded in the foaming process to universal fiberglass reinforced facers, as manufactured by *Johns Manville ENRGY 3*, Denver, Colorado, *Atlas Roofing Products*, Atlanta, Georgia, or equal acceptable to the membrane manufacturer for the system specified. Product shall conform to the requirements of ASTM C 1289, Type II, and Grade 2.
- Product: Tapered ENRGY 3 shall have an **R value of 30 or greater**, or as supplied on tapered insulation drawings, whichever R value is deemed higher. Taper: 1/8 inch per foot slope with 1/4 inch per foot crickets (existing buildings); 1/4 inch per foot slope with 1/2 inch per foot crickets (new buildings). Minimum 4.25 inch at drain locations. Filler blocks same material as tapered stock. R Value: 5.7 per inch. Compressive Strength: 25 psi minimum at any point, per ASTM D1621-73.
- F. If UL-Class A fire rating is specified in Section 1.10, then specify the following UL approved insulation: Polyisocyanurate.

1. Standard board size to be 4 ft. x 4 ft.
2. The insulation manufacturer shall substantiate in writing its recommendations for the use of their product under the asphalt based waterproofing membrane bonded with hot asphalt.
3. Provide rigid, closed-cell, halo-carbon blown polyisocyanurate foam core insulation board with organic/inorganic facer sheet on both sides.
 - a. Flat insulation:
 - i. Flat board in thickness as indicated on the drawings. Provide manufacturer's standard length and width.
 - ii. Compressive Strength: 20 psi.
 - iii. Provide 4.2 inches minimum base layer of flat insulation at drains.
 - iv. Crickets shall have a slope of $\frac{1}{4}$ inch per foot or more if the finished slope of the roof is greater than $\frac{1}{8}$ th inch.
 - b. **Tapered ENERGY 3 shall have a standard R value of 30 or greater, in compliance with the 2015 International Energy Conservation Code.** Taper: 1/8 inch per foot slope with $\frac{1}{4}$ inch per foot crickets (existing buildings); $\frac{1}{4}$ inch per foot slope with 1/2 inch per foot crickets (new buildings). Minimum 4.25 inch at drain locations. Filler blocks same material as tapered stock. R Value: 5.7 per inch. Compressive Strength: 20 psi minimum at any point, per ASTM D1621-73. Typical physical properties of tapered insulation shall be as follows:
 - i. ASTM C 1289-01 Type II, Class I, Grade 3 and CAN/ULC S704
 - ii. ASTM C 209, Water Absorption: <1.5% (maximum)
 - iii. ASTM D 2126, Dimensional Stability Change: <2%
 - iv. ASTM D 1621, Compression Resistance (10% Consolidation): 20 psi (172 kPa) min
 - v. ASTM E 96, Moisture Vapor Permeance: <1 perm (57.5 ng (Pa*s*m²))
 - vi. Service Temperature: 100° to 200°F (-73° to 93°C)
 - vii. ASTM D 1623, Tensile Strength: 730 psf (35 kPa) nom.

viii. Provide 4.25" minimum base layer at drains, typical.

G. Comply with requirements of:

1. FS HH-I-1972/GEN.
2. FM Class I per FMRC Standard 4450/4470.
3. UL Class A.
4. ASTM C1289.
5. NFPA 276 or UL Standard 1256.

H. **Cover Board:**

1. JM DexCell FA Glass Mat Roof Board a high performance roof over-lay board where high wind uplift performance is required. It is also used as a thermal and fire barrier. Provide Gypsum Core panel acceptable to the roofing system manufacturer and complying with Factory Mutual requirements for FM approval for Class 1.
2. Gypsum core panel shall be 1/2" thick or equal meeting ASTM C 1278. Meets the Requirements of Type X per ASTM C 1177

I. **Substrate Board on Cementitious Wood Fiber and Steel Decks:**

1. JM DexCell FA Glass Mat Roof Board a high performance roof over-lay board where high wind uplift performance is required. It is also used as a thermal and fire barrier. Provide Gypsum Core panel acceptable to the roofing system manufacturer and complying with Factory Mutual requirements for FM approval for Class 1.
 - a. Gypsum core panel shall be 5/8" thick or equal meeting ASTM C 1278. Meets the Requirements of Type X per ASTM C 1177

J. Insulation Accessories for the Following Deck Types

1. General: Roof insulation accessories shall be as recommended by the insulation manufacturer for intended use and compatible with membrane roofing.
2. **Insulation fasteners on Steel and Wood decks:** Mechanical fasteners for securement of insulation to steel and/or wood decking shall be approved by the insulation manufacturer for the system specified but not less than a #14 fastener. Base of Design: JM All Purpose Fasteners.
3. Number of fasteners and layout will be as recommended by the manufacturer and as per FM Approval Guide for 1-105 wind

uplift but not less than what is specified in Part 3
EXECUTION.

4. Length of fastener shall be determined by the thickness of the decking and any fill, and will vary with the thickness of the insulation. Fasteners shall be of appropriate length to achieve an embedment of 1.5-inch for Steel and 2 inches for Cementitious Wood Fiber decks. Where applicable, all fasteners must pass through steel decking, through top flutes ONLY. Where underside of decking is exposed as finished space, fasteners shall not be permitted, and the system manufacturer will provide alternate attachment means in order to maintain required full system warranty and wind uplift requirements. Fasteners shall meet the deck pullout resistant requirements of FM 1-105 for wind uplift.

K. **Substrate board Fasteners and Plates and Two Part Urethane Insulation Adhesive on Cementitious Wood Fiber Decks:**

1. For Tectum: JM Polymer Auger Fasteners and 3 inch Flat Bottom Plates to be used along with Two Part Urethane Insulation Adhesive on the Substrate Board layer on all Cementitious Wood Fiber Decks. Basis of design: JM Polymer Auger Fasteners
2. For Tectum, Urethane Adhesive: Manufacturer's two component urethane adhesive formulated to adhere insulation to substrate and or to other insulation. Basis of Design: JM Two-Part Urethane Insulation Adhesive
3. Number of fasteners and layout will be as recommended by the manufacturer and as per FM Approval Guide for 1-105 wind uplift or to meet the manufacturer's requirements to meet the 120 mph three (3) second gust but not less than 5 fasteners per 4'x4'board.
4. Wood Nailer Strips: Comply with the requirements in Section 06100, "Rough Carpentry".

L. **Insulation Adhesive for all layers above the first layer of insulation on Steel, Wood, and above the cover boards on the Cementitious Wood Fiber decks and all layers of insulation on Concrete, Lightweight Concrete, and Gypsum decks.**

1. Urethane Adhesive: Manufacturer's two component urethane adhesive formulated to adhere insulation to substrate and or to other insulation. Basis of Design: JM Two-Part Urethane Insulation Adhesive.

2.08 VAPOR BARRIER ON CONCRETE, LIGHTWEIGHT CONCRETE AND GYPSUM DECKS

- A. Roofing Membrane Sheet: ASTM D 6163, Grade S, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified. Product: DynaWeld Base
1. Thickness: 120 mil (3.05 mm)

2. Tensile Strength @ 0°F (-18°C)
 - a. Machine Direction. 105 lbs. force/in. width (467 N)
 - b. Cross Machine Direction. 80 lbs. force/in. width (356 N)
3. Elongation @ 0°F (-18°C)
 - a. Machine Direction. 5.0%
 - b. Cross Machine Direction 5.0%
4. Tensile-Tear
 - a. Machine Direction. 105 lbs./in. (18.38 kN/m)
 - b. Cross Machine Direction. 80 lbs./in. (16.63 kN/m)
5. Low Temperature Flexibility. -10°F (-23°C)
6. Dimensional Stability
 - a. Machine Direction. 0.1% change
 - b. Cross Machine Direction. 0.1% change
7. Roll Sizes: 100 Square feet (9.29 m)
8. Roll Weight: 84 lbs.
9. Roll Length: 32'- 10"
10. Roll Width. 39-1/8 inches (1m)

2.09 VAPOR BARRIER ON STEEL AND WOOD DECKS

- A. Provide vapor barriers with the following properties based on testing manufacturer's standard products, according to test methods indicated, applied to substrates simulating Project conditions using same materials and applications to be used for Project.
 1. Water-vapor transmission (flat condition): 0.000 grams/hr./sq. meter, per ASTM E-96 Procedure B.
 2. Water-vapor transmission (flex test): 0.0134 grams/100 sq. in., per petri dish method, Standard test #2.
 3. Tensile strength: 25,000 lbs./sq. in per ASTM D882-64T.
 4. Bursting strength: 96.6 lbs./sq. in, per ASTM D77463T.
 5. Tear strength: 1,800 lbs./sq. in, per ASTM D 1004-66.
 6. Melting point: 480°F, per Fisher-Johns test.

7. Fire hazard classification:
 - a. Flame spread: 5 per ASTM E-84 and NFDA 255
 - b. Fuel contributed: 0 per ASTM E-84 and NFDA 255.
 - c. Smoke developed: 5 per ASTM E-84 and NFDA 255.

2.10 ASPHALT

- A. Asphalt shall be certified in full compliance with the requirements of 190-Type III (Type IV not permissible in Northern United States) asphalt listed in Table 1, ASTM D-312-89. Each container, or bulk, shipping ticket shall indicate the equiviscous temperature (EVT), the finished blowing temperature (FBT), and the flash point.

2.11 ROOF CURBS

- A. Provide a minimum of one (1) row of wood blocking to top of existing curb to raise the flashing a minimum of 12 inches above finished roof wearing surface.
- B. Skylight roof curbs shall be provided with a minimum R-5 insulation.

2.12 MISCELLANEOUS

- A. **Expansion Joint Water Stop:** Provide 16 oz. by 3" deep continuous copper "V" with soldered seams, sealant, and fiberglass insulation. Refer to drawings for additional information.
- B. **Expansion Joints & Covers:** Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed-cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a patented bifurcation process. Provide curb-to-wall and/or curb formed 4" wide & 4" vertical product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit guarantee. Product: *JM Expand-O-Flash, Soprema Soprajoint*, or approved equal by the Architect.
- C. **Water Cut-off Mastic:** *Soprema Sopramastic* or as approved equal by the Architect.
- D. **Pitch Box:** In lieu of pitch pockets all pipes will be flashed with the manufacturers Liquid applied flashing system. Basis of Design: PermaFlash Bituminous Flashing System.
- E. **Roof Drains:**
 1. **For New Construction roofs,**
 - a. Single Drain (Primary Only) Model ZC100-DP-EA-VP as manufactured by Zurn, or approved equal by Architect.

- b. Double Drain (Primary with Overflow) Model ZC163-DP-EA-VP-W4 as manufactured by Zurn, or approved equal by Architect.
 - c. Overflow Drain Downspout nozzle Z-199 SS as manufactured by Zurn, or approved equal by Architect.
 - 2. **For Existing Roofs,** The Contractor shall remove the existing Roof Drain Dome Strainers and Flashing Clamp Rings and discard, clean and prep remaining drain bowl assembly for new roofing. Contractor to Install New Cast Iron Dome Strainers, Flashing Clamp rings and 2" Cast Iron Static Extension Ring, replace all missing or damaged components with new to match as manufactured by Zurn, or approved equal by Architect.
- F. **Walkway Pads:** Provide roofing manufacturer's mineral-granule-surfaced, reinforced modified asphalt composition, slip-resisting pads, manufactured as a traffic pad for foot traffic provided by roofing system manufacturer, with a pad size of 32 inch x 32 inch, similar or equal to *Johns Manville DynaTred*.
- G. **Coping System:** Provide manufacturer's factory-fabricated coping, consisting of a base piece and a snap-on cap. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit 20-Year Guarantee. Provide similar or equal to *JM Presto-Lock Coping*.
 - 1. Typical Performance Characteristics:
 - a. Provide design that allows coping sections to expand and contract freely, while locked in place on anchor cleats.
 - b. Provide design that allows coping sections to be locked to extruded aluminum anchor bar and anchor cleats by mechanical pressure from hardened stainless steel springs factory-attached to the anchor cleats.
 - c. Provide all splice plates, include factory-applied dual Non-curing sealant strips capable of providing a water-tight seal.
 - d. Performance Requirements:
 - i. FM 1-90 approved.
 - ii. Exceeds 75 lbs. per lf outward load in accordance with ANSI/SPRI ES-1-98 Wind Design Standards Test Method RE-3.
 - iii. Exceeds 120 lbs. per lf upward load in accordance with ANSI/SPRI ES-1-98 Wind Design Standards Test Method RE-3.
 - 2. Typical Physical Properties:
 - a. Coping Cover:

- i. Provide snap-on cover, 12 feet (3.65 m) long, with matching 8 inch (203 mm) wide concealed splice plate and two factory-applied non-curing sealant strips.
 - ii. Metal Thickness
 - a. For walls up to 15" wide; Provide .050 inch (1.3 mm) thick aluminum in with Kynar 500 finish.
 - b. For walls over 15" wide and up to 23" wide; Provide .063 inch (1.6 mm) thick aluminum in with Kynar 500 finish.
 - c. For walls over 23" wide and up to 36" wide; Provide .080 inch (2.3 mm) thick aluminum in with Kynar 500 finish.
 - b. Anchor Clip:
 - i. 12 inch (304 mm) long, 20 gauge (1.0 mm), G-90 galvanized steel anchor clip with hardened stainless steel spring per clip.
 - ii. Four (4) pcs Anchor Clips per 12' Coping Cover.
 - c. Fasteners:
 - i. Provide corrosion-resistant #12 x 1-5/8 inch, with hexagonal head and 5/8 inch (16 mm) bonded washer with EPDM washer seal.
 - ii. Provide equivalent corrosion-resistant fastener of type and size required for specific substrate types.
- H. **Fascia System:** Provide manufacturer's factory-fabricated fascia, consisting of an extruded aluminum continuous anchor bar and a snap-on cover. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit 20-Year Guarantee. Provide similar or equal to *JM Presto-Tite Fascia* or *JM TerminEdge Fascia*.
- I. **Roofing Granules:** Provide ceramic-coated roofing granules matching the specified cap sheet, provided by the roofing system manufacturer.
- J. **Miscellaneous Accessories:** The Contractor shall provide all miscellaneous accessories recommended by the roofing system manufacturer for the 20-Year No Dollar Limit Guarantee, under the base bid provided for this project.
- K. Contractor shall be responsible for all incidental electrical and plumbing work required to complete work under this contract.

PART 3 - EXECUTION

3.01 SURFACE INSPECTION

- A. Verify that Work of other trades which penetrates the roof deck or requires personnel and equipment to traverse the roof deck has been completed.
- B. Before commencing work, all surfaces shall be smooth, clean, dry, and free of any depressions, waves, or projections and debris that would adversely effect the installation of the membrane.
- C. Examine surfaces for inadequate anchorage, foreign material, moisture, and unevenness that would prevent the execution, and quality of application, or the roofing system as specified. Do not proceed with application of the roofing system until all defects are corrected.
- D. Before commencing work, the Owner's Representative, together with the roofing contractor and the manufacturer's supervisor shall inspect and approve the deck condition (slopes and nailing supports if applicable) as well as verticals on parapet walls, roof drains, stack vents, vent outlets and others, building joints, etc. If applicable, a non-compliance notice shall be submitted to the contractor so that adjustments can be made. Verify that the deck has been / is re-attached to the structural members as outlined on the contract drawings and the Building Code of the State of NY. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place. Commencement of work shall imply acceptance of surfaces and conditions.
- E. Verify that the deck surfaces are dry and free of snow or ice. Verify that the work of other trades has been properly completed.
- F. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation. Verify that surface plane flatness and fastening of steel roof deck complies with requirements of roofing manufacturer for proper installation of roofing system.
- G. Do not install materials in conditions of inclement weather.
- H. Proceed with installations only after unsatisfactory conditions have been corrected; beginning installation means acceptance of substrate.

3.02 SURFACE PREPARATION

- A. Concrete, Gypsum, Steel, Cementitious Wood Fiber and Wood Decks: Verify securement, flatness, joint spacing, and slope of decking.
 - 1. Replace damaged or defective areas prior to commencement of work under this section and shall be brought to the attention of the Owner's Representative.

- a. Steel, Cementitious Wood Fiber and Wood Decks must be refastened to meet the 2020 Building Code of the State of New York.(see Section 035113 for Cementitious Wood Fiber Deck re-fastening.
 - b. Concrete and Gypsum should be smooth, clean, dust free and without any lumps or knobs to keep the insulation from lying flat. Grind down any raised areas.
- 2. Seal joints of plywood with tape.
- 3. Fill knots with latex filler.
- B. Clean the substrate of projections and substances detrimental to the work. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof drain plugs when no work is taking place, or when rain is forecast.
- D. Install cant strips and similar accessories as shown and as recommended by the roofing systems manufacturer even though not shown.
 - 1. Wood Blocking is required, as indicated in the details and drawings. Wood Blocking must meet the height of the new Insulation.
 - 2. Provide new treated wood blocking where existing wood blocking, that is not indicated to be removed, is deteriorated.
 - 3. Provide treated wood blocking at perimeter of roofing membrane, all sides of penetrations by roof accessories, mechanical curbs, and other areas where blocking is required by membrane manufacturer to nail membrane and flashing in place.
 - 4. Provide wood blocking to raise existing equipment curbs flashing heights. Maintain 8 inches minimum height above membrane.
 - 5. In all areas where nailers are required, they shall be firmly anchored to the deck to resist a minimum force of 200 lbs. /lineal foot (2.9 kN/m) in any direction. A ½" (15 mm) of each end. Spacing and fastener embedment shall conform to FM Global Loss Prevention Data Sheet 1-49.
 - 6. Secure wood blocking to wood blocking with 16 p nails at 6 inches on center. Stagger nails on each side of blocking.
 - 7. All woodwork to be reused shall resist a minimum force of 200 lbs. /lineal foot (2.9 kN/m) in any direction and shall be

free of rot. If any existing woodwork is questionable, it shall be removed and replaced with suitable materials.

- E. **Re-Roof Preparation:** Remove all roofing membrane, surfacing, cover boards, insulation, fasteners, asphalt, pitch, adhesives, etc. down to the deck in a re-roofing application or in new construction to a clean properly secured deck.
1. Remove an area no larger than can be re-roofed in one day, or made watertight if inclement weather is imminent.
 2. Tear out all base flashings, counter flashings, pitch pans, pipe flashings, and vents and like components necessary for application of new membrane.
 3. Remove abandoned equipment curbs, skylights, smoke hatches, and penetrations. Install decking to match existing as directed by the Owner's Representative.
 4. Raise, (disconnect by licensed craftsmen, if necessary) all HVAC units and other equipment supported by curbs to conform with the following: Modify curbs as required to provide a minimum 8" base flashing height measured from the surface of the new membrane to the top of the flashing membrane.
 5. Nail top of flashing and install new metal counterflashing prior to reinstallation of unit. Perimeter nailers must be elevated to match elevation of new roof insulation.
- F. Immediately remove all debris from roof surfaces; demolished roof systems may not be stored on the roof surface. Proceed with installations only after unsatisfactory conditions have been corrected. Prime the substrate if recommended by roofing system manufacturer; comply with manufacturer's recommendations.
1. When installing a new roof over existing roof, provide barrier sheet as recommended by new roofing system manufacturer.
- G. Coordinate roofing with flashings and other adjoining work to insure proper sequencing of the entire work.
- H. **Metal and Wood Decks:** Verify securement and slope of metal and wood decking.
1. Replace damaged or defective areas prior to commencement of work under this section.
 2. Verify flutes of steel deck are clean and dry. Wood decks are clean and without splinters or broken boards.
 3. Inspect metal deck closely for: proper securement of panels to joists with no loose decking/connections, differential deflection at side or end laps, side lap fasteners in place, damaged panels, corrosion. Verify that the deck has been re-attached to the structural members as outlined in Division 5 "Metal Decking" and/or as shown on the Contract Drawings. Re-

secure decking with Traxx/5 self-tapping screw and $\frac{3}{4}$ inch washer, 6 inch on center (at every rib) into the purlin/joist with the purlin/joist spaced a maximum of 6 feet on center to meet the Building Code of NY State.

4. Wood decks should be securely fastened into the joist 12 inches on center with screws.
5. Verify that roof openings and penetrations are in place and set and braced, and that roof drains are securely clamped in place.
6. Verify that wood cants, blocking, curbs and nailers are securely anchored to the roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
7. Unacceptable panels should be brought to the attention of the Owner's representative and Architect and must be corrected prior to the installation of the roofing system.
8. Make sure that all counterflashing receivers, curbs, etc., are constructed in such a manner as to provide a minimum 8-inch base flashing height measured from the finished roof's surface to the top of the base flashing membrane.

I. **Cementitious Wood Fiber Plank Decks:**

1. Re-secure all planks with JM RetroDrillers and insulation plate at the rate of 3 screws per plank on every purlin. Penetrate the side flange of the purlin by one inch.
2. Secure at perimeter and all projections.

3.03 **REMOVALS**

- A. Remove the existing roofing and insulation down to the existing deck along with all fasteners and plates, removing only that portion that can be made watertight at the completion of the workday or before any inclement weather.
- B. Verify deck is clean and smooth, free of depressions, waves, or projections. Verify flutes of steel deck are clean and dry.
- C. Do not apply roofing materials to damp, frozen, dirty, dusty, or deck surfaces unacceptable to the manufacturer. No trace of surface water shall be present. Materials under roofing shall be completely dry. Sweep surface clean of dust, debris, and loose and foreign materials.
- D. Surfaces that will receive roofing shall be in a condition ready to receive the required roofing per the manufacturer's requirements.
- E. Start of application of roofing signifies acceptance of existing conditions.

3.04 **INSTALLATION**

- A. The contractor shall note well that the roofing manufacturer shall supply a factory-authorized field representative to periodically supervise the entire installation of this contract, as a part of all Base Bids and alternates proposed. No exceptions will be made for this requirement. Work shall not begin on this project until this representative has arrived to the project, inspected it, and authorized for work to start. The factory-authorized field representative shall perform a minimum of 8 field visits per site and issue a report stating the findings of each site visit. The report shall include name of factory authorized field representative; building name; date of visit; weather condition; conformance or non-conformance of installation of roofing materials as per specifications; directions given if any to correct non-conformance issues.
- B. The Contractor shall install roofing membrane on clean and dry surfaces, in accordance with the manufacturer's requirements and recommendations.
- C. Perform roofing work on a continuous basis as surface and weather conditions will allow. Phase application of the roofing membrane will not be permitted. Apply all materials to the area during the same day that it is started, including making all areas watertight. All seams are to be sealed each day.
- D. Protect adjoining surfaces against any damage that could result from roofing installation.
- E. The Contractor shall install only as much roofing as can be completed in one day. If weather conditions do not permit such completion, exposed areas shall be temporarily weatherproofed to prevent any water or snow infiltration from damaging other materials already installed, in particular, the thermal insulation.
- F. Contractor shall supply a fire-watch crew for a minimum of two (2) hours past the point of completion of the day's work on any areas where a torch is being used. A separate fire-watch crew shall be assigned to interior space and exterior space. All employees of the contractor using or assisting with the installation of torched products must be NRCA CERTA trained in the use of torched applications.
- G. The Contractor shall coordinate all activities with the Owner and Construction Manager to ensure that there are no inhabitants of the building working below him at the time of the installations.
- H. All local and state requirements regulating the use of propane shall be strictly adhered to.

3.05 EQUIPMENT

- A. Maintain all equipment and tools in good working order.
- B. Equip kettles and tankers with accurate, fully readable thermometers. Do not heat asphalt to or above its FP. Avoid heating at or above FBT, should conditions make this impracticable, and exception is

granted by the Architect, heating above the FBT must not be done for more than four (4) hours. Application temperatures must not be more or less than 25°F of the EVT. No kettles will be allowed on roof surfaces.

3.06 WOOD BLOCKING, CANTS AND PLYWOOD

- A. Wood blocking is required, as indicated in the details and drawings, and as required by existing field conditions, whether specifically detailed or not.
- B. Provide new treated wood blocking where existing wood blocking that is not indicated to be removed is deteriorated
- C. Provide treated wood blocking at perimeter of roofing membrane, all sides of penetrations by roof accessories, mechanical curbs, and other areas where blocking is required by membrane manufacturer to nail membrane and flashing in place.
- D. Blocking Thickness: Equal to thickness of insulation.
- E. Provide wood blocking to raise existing equipment curbs flashing heights; maintain 8 inches minimum height above membrane, or as required to obtain membrane roofing system manufacturer's 20-Year No Dollar Limit Warranty.
- F. Provide wood blocking, and plywood at locations indicated.
- G. In all areas where nailers are required, they shall be firmly anchored to the deck to resist a minimum force of 200 lbs/lineal foot (2.9 kN/m) in any direction. A ½" (15 mm) of each end. Spacing and fastener embedment shall conform to FM Global Loss Prevention Data Sheet 1-49.
- H. Secure wood blocking to wood blocking with 16d nails at 6 inches on center. Stagger nails on each side of blocking.
- I. All woodwork to be reused shall resist a minimum force of 200 lbs./lineal foot (2.9 kN/m) in any direction and shall be free of rot. If any existing woodwork is questionable, it shall be removed and replaced with suitable new materials.

3.07 ASPHALT PRIMER APPLICATION

- A. Prime all dissimilar surfaces to which asphalt or membrane will come in contact. Apply at the rate of 150-200 sq. ft/gallon. Coat all metal flashings, fascia, wood blocking and parapet walls with primer, which will come in contact with membrane.

3.08 INSTALLATION OF VAPOR BARRIER ON STEEL AND WOOD DECKS AND THE SUBSTRATE BOARDS ON CEMENTITIOUS WOOD FIBER (tectum) DECKS

- A. Priming
 - 1. All surfaces must be swept clean and free from oil, grease, rust, scale, loose paint and dirt.

2. SA Primer is to be mixed well before use. Do not thin. Apply by spraying only. Roller application not acceptable. Apply uniformly with no streaks or puddles. All care must be taken to keep primer from coming into building. Allow to dry completely. Primer should be tacky but should not transfer to a clean dry finger.
- B. Roll out Vapor Barrier SA membrane over the steel deck (so that it adheres to the top flutes of the corrugated steel) and wood deck that has received the SA Primer Low VOC. Be sure to stagger the end laps and overlap the side laps by a minimum of 3". Once the membrane is in the desired location, hold the membrane tight while peeling away the silicone release liner at an angle. Install additional rolls in the same way, with 3" side laps and 6" end laps. A minimum 75 pound split linoleum roller should be used over the entire surface and a 4" rubber roller should be used in the overlap areas. Provide plywood under the sheet in order to roll in the seams and end laps to a watertight condition.

3.09 INSTALLATION OF THE VAPOR BARRIER ON CONCRETE, LIGHTWEIGHT, AND GYPSUM DECKS

A. GENERAL

1. Vapor Barrier shall be installed in accordance with the manufacturer's current published specifications and recommendations.
2. Install the Base Ply sheet to the Concrete deck as per FM Global Data sheet 1-29.
 - a. Install the asphalt primer as per the manufactures written instructions but not less than 1 gallon per 100 sq.ft.
 - b. Allow to dry thoroughly prior to installing vapor barrier.
 - c. Thermally fuse as per the manufacturer's recommendation and details the SBS vapor barrier to the primed concrete deck only lapping end laps 6 inches and side laps 3 inches.
 - d. Provide only trained employees that have been certified to install torch applied materials. Must be NRCA's CERTA program certified.

3.10 INSTALLATION OF INSULATION

- A. Install insulation in accordance with the manufacturer's requirements. The insulation shall provide a smooth surface to accept the roof membrane; the tapered insulation shall be installed so as to conform to the slopes indicated in the tapered insulation shop drawings. All joints shall be tight and in parallel courses with end joints staggered. When more than one layer of insulation is to be used, succeeding layers are to be laid staggered in

relation to the previous layer of insulation and all joints shall be likewise staggered. Insulation and cover board shall be neatly cut to fit around all penetrations and projections with a maximum allowable gap of $\frac{1}{4}$ " (8mm). Open joints shall be repaired with like insulation material. When the insulation is installed on steel decks after a complete tear-off or in new construction, no edges are to be left unsupported along the flanges. Insulation shall be feathered or tapered to provide a sump area a minimum of 48"x48" where possible at all drains. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall thickness is 3 inches (38 mm) or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

- B. Coordinate installing roof system components so insulation and cover board is not exposed to precipitation or left exposed at the end of the workday; apply only as much insulation to the roof as can be covered the same day with roofing membrane. At the conclusion of each day's work, seal exposed edges of the insulation. Cut and remove seal upon continuation of the work. Comply with the roofing system manufacturer's written instructions for installing roof insulation and cover board.
- C. **Mechanically fasten on Steel and Wood decks the flat base layer of insulation** which must not be less than 2 inches thick. Install this first layer of insulation with #14 fasteners and 3 inch insulation Plates at the minimum rate of:
 - 1. Field: **8** fasteners per 4'x4'board
 - 2. Perimeter: **12** fasteners per 4'x4'board
 - 3. Corners: **16** fasteners per 4'x4' board
- D. Fasten first layer of insulation to Steel and Wood decks using screw guns, drive the fastener until the plate does not turn. Care must be taken not to overdrive the fastener and fracture the skin of the insulation. Fastener must be tight enough so that the plate does not turn as per Factory Mutual, fasteners must penetrate the steel deck at the top flange a minimum of $\frac{3}{4}$ of an inch. Remaining insulation is all set in Two Part UIA as follows.
- E. **On Cementitious Wood Fiber decks install the 2 Part urethane insulation adhesive on the back side of the Substrate Board** in a serpentine fashion, applied in $\frac{3}{4}$ inch wide beads at the following minimum rate:
 - 1. Field: Beads at **4** inch on center
 - 2. Perimeter: Beads at **4** inch on center
 - 3. Corner: Beads at **4** inch on center
- F. Once the 2 part insulation adhesive sets and is still tacky, flip the board over and gently set it into place while it is still tacky.
 - 1. If adhesive reaches its tack-free state, remove and re-apply adhesive.

2. Immediately install 4 Lite-Deck fasteners and plates per 4'x4' board on the first thermal insulation layer only.
 3. Subsequent layers of insulation and cover board will be installed with the two part insulation adhesive on the top side of the previous installed insulation board following the minimum bead requirements above.
- G. Press the thermal layer into the adhesive to a firm and uniform bearing and immediately install 5 Poly Auger Fasteners and Flat bottom plates.
1. Use ballast on all four corners of the board for a minimum of 30 minutes to ensure contact of material and adhesive, if necessary.
- H. **Set all Remaining Insulation and Cover Boards on all deck types** in Two Part Urethane Insulation Adhesive over all tapered and flat insulation in accordance with manufacturer's recommendations and according to approved shop drawings, as required to achieve the full system warranty and fasten according to the requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification. Install boards with long joints in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with like material. Cut and fit boards within 1/4 inch (6 mm) of nailers, projections, and penetrations. Install cover boards in Two Part Urethane Insulation Adhesive in ~~3~~ 4 inch beads serpentine at the minimum rate of:
1. Field: Beads at 4 inch on center
 2. Perimeter: Beads at 4 inch on center
 3. Corner: Beads at 4 inch on center
- I. Keep insulation absolutely dry at all times. Discard insulation that contains moisture.
- J. Install only as much insulation as can be covered with roofing membrane the same day.
- K. Repair any defects or installation errors prior to next phase of roof system installation.
- L. Taper boards a minimum distance of 24 inches back from roof drains for positive drainage. Trim surface of boards where necessary at roof drains so completed surface is flush and does not restrict flow of water. Apply no more insulation material than can be sealed with membrane in the same day.
- M. Place insulation perpendicular to deck flutes with edges over flutes surfaces for bearing support. Place a minimum of one fastener for every two square feet of insulation.
- N. Additional fasteners may be required along perimeter depending upon height and location of building. Contractor to check and verify through FM guide book, and verify requirements in writing through the roofing system manufacturer.

- O. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces; tape joints of insulation in accordance with insulation manufacturer's instructions.
- P. Offset the joints of subsequent insulation layers or perlite a minimum of 6" over the underlying insulation layer.
- Q. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes greater than 45 degrees per manufacturer's instruction.

3.11 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. As a base standard, install the roofing system specification *JM's 2PID-HW* according to roofing system manufacturer's written instructions, applicable recommendations of *Johns Manville*, and requirements in this Section. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel. Where roof slope exceeds ½ inch per 12 inches (1:24), contact the membrane manufacturer for installation instructions regarding installation direction and back-nailing. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent. Provide tie-offs at the end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system. Remove and discard temporary seals before beginning work on adjoining roofing.
- B. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.12 BASE PLY INSTALLATION ON ALL DECKS

- A. For Base Ply membrane application, apply asphalt at a minimum temperature of approximately 425°F - Type III (Type IV not permissible in Northern United States). The maximum heating temperature shall be 450°F - Type III. Apply asphalt at a rate of 25-30 lbs. /sq. at a distance not to exceed three (3) feet ahead of the roll to provide a sufficient adhesion with the asphalt of the membrane.
- B. For low temperature application, it may be necessary to heat asphalt at higher temperatures so that application temperature is adequate. However, the heating temperature of asphalt shall not exceed 450°F

or the indicated flash point. Care must be taken so the asphalt in the kettle is continuously used to prevent distillation.

- C. Install modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows: Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer. Unroll dry base ply membrane on the cover board for alignment. Each strip shall have four (4) inch side laps and six (6) inch end laps.

- 1. Begin at low point of roof.
- 2. Place membrane so edge lap will be centered on drain.

3.13 BASE PLY FLASHING INSTALLATION

- A. Prior to application, the vertical surface receiving the base ply flashing shall receive a coat of primer at the rate of 150-200 sq.ft./gallon. This primer coating must be dry before application of the base sheet flashing.
- B. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to the roofing system manufacturer's written instructions and as follows:
 - 1. Prime all substrates with asphalt primer if required by roofing system manufacturer,
 - 2. Backer Sheet Application: Fully adhere backer sheet in hot steep asphalt at a rate of 25 lbs. per 100 square feet. Adhere the backer sheet over roofing membrane at cants in hot steep asphalt.
- C. Lay base ply flashing in strips three (3) feet wide to the vertical surface, extending onto the flat surface of the roof a minimum of four (4) inches. Side laps shall be three (3) inches and shall be staggered a minimum of four (4) inches with the laps of the base ply. Extend base flashing up walls or parapets a minimum of 8 inches (200 mm) above roofing membrane and 4 inches (100 mm) onto field of roofing membrane.
- D. Flashing Sheet Application: Torch apply flashing sheet to substrate; torch weld base ply flashing directly on its support from bottom to top followed by the torching of the roof tie-in.
- E. After installation of base ply flashing, check all lap seams on the flashing by running a heated trowel along the edge of the seams.
 - 1. Thoroughly seal all voids in the corners and seams.
 - 2. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing with similar or equal to *JM Termination Bar*.

3.14 TOP PLY INSTALLATION ON ALL DECK TYPES

- A. Once the base ply is applied and does not show any defects, install the top ply.
- B. Heat weld a full width piece of cap sheet listed. Fully thermally fuse (torch) the Cap Sheet to the Base Sheet as per the Manufacturer's Details and specifications.
- C. Subsequent sheets are to be applied in the same manner with 4" side laps and 6" end laps over preceding sheets.
- D. Heat-weld all sheets so that they are firmly and uniformly set.
- E. All edges must be rolled with a 3" rounded edge roller; a 1/8" to 3/8" bleed-out shall be visible.
- F. Preparation of laps require scuffing away all loose granules. Heat and embed all remaining granules.
- G. Apply heat to the cap sheet being seamed, making sure both have good compound flow.
- H. Laps must be checked for proper flow.
- I. **Contractor shall supply a fire-watch crew for a minimum of two (2) hours past the point of completion of the day's work on any areas where a torch is being used. A separate fire-watch crew shall be assigned to interior space and exterior space. All employees of the contractor using or assisting with the installation of torched products must be NRCA CERTA trained in the use of torched applications.**

3.15 CAP MEMBRANE FLASHING PLY INSTALLATION

- A. Lay top ply flashing in strips three (3) feet wide.
 - 1. Side laps shall be three (3) inches and shall be staggered a minimum of four (4) inches from top ply laps in order to avoid excessive thickness.
- B. Using a chalk line, lay out a straight line on the field top membrane ply surface, parallel to the roof edge, six (6) inches inside the roof from the base of the cant strip or right angle to be flashed.
 - 1. Using a torch and heated flat trowel, embed the surface granules into the heated and soft bitumen from the chalk line to the edge of the top ply and to the top of the cant or right angle. NOTE: This embedment procedure may also be accomplished through the use of a manufacturer's approved granule embedment tool.
- C. Torch weld top ply in accordance with recommendations of system manufacturer, onto the field base membrane ply a minimum of 6".

1. During this application, simultaneously melt both surfaces forming an asphalt bead that pushes out in front of the top sheet.
- D. Do not burn the membrane and their respective reinforcements.
- E. Stagger base ply and top ply seams a minimum of 12 inches.
- F. Cap metal clad membrane flashing ply shall have side laps of 3 inches and end laps of 6 inches. Prior to installation of following ply, peel off aluminum facing on laps.
 1. Carefully scope the metal surface with a sharp utility knife along the outer edge of area where metal is to be removed and bitumen is to be exposed.
 - a. Care must be taken to cut only through the metal and not through the membrane fabric reinforcement.
 2. Lightly warm the surface of the metal to be removed using a torch enough to loosen the bond between the metal and bitumen.
 - a. Care must be taken to not overheat this area or scorch adjoining area of finished surfaces.
 3. Immediately after warming surface of metal, carefully peel off metal to be removed.
 - a. Additional warming and cutting may be necessary. To facilitate, warm the metal as you peel away metal.
- G. Ensure the two membranes are perfectly welded, without air pockets, wrinkles, fish-mouths, or tears.
- H. After installation of the top ply, check all lap seams on the top ply using the edge of a hot trowel. Correct any defect.
- I. During installation, avoid asphalt seepage greater than 1/4" at seams. Cover all asphalt seepage immediately with a sprinkling of loose granules, in color to match membrane.

3.16 WATER CUT-OFF

- A. At the end of the day's work, and when precipitation is imminent, a water cut-off shall be constructed at all open edges. Construct the cut-off with the same membrane and asphalt. Cut-off must be able to withstand extended periods of wet weather. The water cut-off shall be completely removed prior to resuming the installation of the roofing system.

3.17 CLEANING

- A. Clean up and remove daily from the site all wrappings, empty containers, paper, loose particles, and other debris resulting from these operations.

- B. Remove asphalt markings from finished surfaces.
- C. Repair or replace defaced or disfigured finishes caused by work of this section.

3.18 PROTECTION

- A. Provide traffic ways, erect barriers, temporary interior partitions and enclosures, fences, guards, rails, enclosures, chutes, and the like to protect personnel, roofs, and structures, vehicles and utilities.
- B. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8" thick.
- C. In addition to the plywood listed above, an underlayment of minimum 1/2-inch recovery board is required on new roofing.
 - 1. Special permission must be obtained from the manufacturer before any traffic will be permitted over new roofing.

3.19 FIELD CONTROL

- A. Field inspection will be performed as outlined under 1.07B of this section.

3.20 PITCH BOXES

- A. Install the roofing manufacturers Liquid Flashing at all Pipes, Stacks and through roof projections.
- B. Install Liquid Flashings as per the membrane manufacturers details and specifications.

3.21 ROOF DRAINS

- A. New Roofs:
 - 1. Set drain flange tight to roof deck.
 - 2. Secure roof drain to roof deck with approved under deck clamp bolted to underside of drain body
 - 3. Insulate roof drain sump and horizontal piping.
 - 4. Coordinate with types, locations, and quantities as indicated on plans.
- B. Existing Roofs:
 - 1. The Contractor shall remove the existing Roof Drain Dome Strainers and Flashing Clamp Rings and discard.
 - 2. Clean and prep remaining drain bowl assembly for new roofing.

3. Contractor to Install New Cast Iron Dome Strainers, Flashing Clamp rings and 2" Cast Iron Static Extension Ring, replace all missing or damaged components with new to match as manufactured by Zurn, or approved equal by Architect
- C. Provide a smooth transition from drain bowl to deck surface.
1. Taper insulation back from drain a minimum of 24" to provide for positive drainage.
 2. Prime all metal surfaces.
- D. Install base ply membrane with lap centered on bowl and as specified under 3.13 of this section ensuring a tight seal at drain.
1. Set 30-by-30-inch (760-by-760-mm) 4 lb lead flashing sheet in a bed of *MBR Flashing Cement* on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of 4 inches (100 mm) beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
 2. Mop into place a reinforcing sheet of base ply material 3 feet square centered on drain.
 3. Flash drain using *JM PermaFlash* system, or similar. Clamp roofing membrane, flashing, and stripping into roof-drain clamping ring. Install stripping according to roofing system manufacturer's written instructions. Extend membranes 1" beyond the inside edge of the drain bowl and temporarily secure with clamping ring.
 4. Proceed with installations only after unsatisfactory conditions have been corrected.
- E. Install top ply as specified under 3.12 of this section.
1. Extend membrane 1" beyond the inside edge of the drain bowl.
 2. Position membrane so as to avoid the occurrence of any seams at drains.
 3. Seal off drain by running a hot trowel along the edge and firmly pressing against the rim.
- F. Install clamping ring and drain covers supplied with drain.
- G. Test all drains for proper flow and watertightness. Correct defects.

3.22 VENT (STACK)

- A. Inspect base ply installation and ensure tight seal around pipe.
- B. Construct and install over base ply a sheet metal vent sleeve with welded or soldered seams and as per details.

1. Provide a minimum 5-inch base flange.
 2. Prime all metal surfaces.
 3. Heat metal flange with torch prior to setting in place and firmly pressing on flange to ensure even contact with roof surface.
- C. Torch into place a reinforcing sheet of base ply material three feet square over the vent.
1. Seal all seams and edges with a heated trowel.
- D. Install top ply as specified under 3.12 of this section.
1. Cut membrane to fit tight against stack sleeve and seal by running a heated trowel around vent base.
- E. Install metal vent cap, "ZURN" Z-193 VANDAL-PROOF VENT CAP, DURA-COATED CAST-IRON BODY AND HOODED DOME CAP with VANDAL PROOF SECURING DEVICE

3.23 WALKWAYS

- A. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions. Set all walkway pads in cold-applied adhesive.
- B. Provide walkway pads under each ladder, roof hatch and completely around each HVAC unit, and to any other areas as designated on the drawings.
- C. Layout sheets dry, adjusting spacing to be uniform, cut and trim pieces as required to fit conditions, direction changes, and closing.
1. No piece shall be less than 24".
 2. Provide a 2" gap between sheets for drainage.
- D. Align the sheets to be straight and true, using a straight edge or snap lines as required.
- E. Proceed with installations only after unsatisfactory conditions have been corrected.

3.24 EXPANSION JOINT

- A. Ensure all surfaces are soundly secured and fully primed prior to the installation of any membrane or flashing.
- B. Install base ply as specified under 3.11 of this section.
1. Stop base ply membrane at juncture of horizontal to vertical surface.

- C. Install base ply flashing as detailed and in accordance with 3.10 of this section.
 - 1. Flashing must extend a minimum of 4" onto the base ply and continue up the vertical surface onto the top edge of the expansion joint support and secure using roofing nails.
 - 2. Fill the expansion joint with compressible insulation supported by a layer of polyethylene film nailed off at top.
 - 3. Provide continuous 10 oz. copper "V" with soldered seams. Copper "V" to run full length of expansion joint and, where applicable, turn down into cavity end walls. Fill copper "V" with silicone sealant. Refer to all pertinent details shown on the drawings.
 - 4. Architect is to verify any fire code ratings for expansion joints.
- D. Provide a continuous joint cover of mineral cushion as detailed.
 - 1. Width of cushion to be three times that of the joint.
- E. Install prefabricated expansion joint cover by torching flanges onto expansion support and ensuring a minimum of 4" surface contact.
- F. Install top ply flashing as per 3.12 of this section.
 - 1. Run flashing to top of vertical surface of support and onto roof surface a minimum of 6".
 - 2. Set all granules into membrane using a hot trowel where flashing overlap occurs.
 - 3. Install a slip-sheet over joint as separation between joint cover and top ply.
- G. Cover the entire expansion joint with a single layer of top ply flashing as detailed and following specifications outlined under 3.12 of this section.

3.25 CORNER FLASHING

- A. Inside Corner:
 - 1. Precut all flashing pieces and prime all surfaces prior to installation.
 - 2. Fabricate gusset 4" wide by 8" long with a 2" triangular tip.
 - a. Install gusset into corner using a torch and firmly pressing with a hot trowel.
 - b. Set gusset with triangular tip on base ply and wrapping the corner a minimum 2" on each side.

3. Pre-cut base flashing membranes to provide a 4" tie-in to roof surface and 3" return at corner.
4. Set in hot asphalt the first base flashing sheet into corner over gusset pressing overlap and tie-in firmly into position with a hot trowel.
5. Torch second base flashing sheet into position with edge tight into corner.
 - a. Cut off base tie-in selvage at 56° from vertical.
 - b. Seal all edges with a hot trowel.
6. Precut top flashing membranes to provide a 6" tie-in to roof surface and 3" return at corner.
7. Set in hot asphalt the first top flashing sheet into corner over second base ply pressing overlap and tie-in firmly into position with a damp sponge.
 - a. Set all granules into membrane using a hot trowel where flashing overlap occurs.
8. Torch second top flashing sheet into position with edge tight into corner.
 - a. Cut off base tie-in selvage at 45° from vertical.
 - b. Press flashing firmly into position with a damp sponge.
 - c. Seal all edges with hot trowel and sprinkle granules to cover seeping asphalt.

B. Outside Corners:

1. Precut all flashing pieces and prime all surfaces prior to installation.
2. Fabricate gusset 4" wide by 8" long with a 2" triangular tip.
 - a. Install gusset into corner using a torch and firmly pressing with a hot trowel.
 - b. Set gusset with triangular tip on base ply and wrapping the corner a minimum 2" on each side.
3. Precut base flashing membranes to provide a 4" tie-in to roof surface and 3" return at corner.
4. Torch first base flashing sheet into corner over gusset pressing overlap and tie-in firmly into position with a hot trowel.

5. Torch second base flashing sheet into position with returns wrapped around corners.
 - a. Cut off base tie-in selvage at 45° from vertical.
 - b. Seal all edges with a hot trowel.
6. Precut top flashing membranes to provide a 6" tie-in to roof surface and 3" return at corner.
7. Torch first top flashing sheet into corner over second base ply pressing overlap and tie-in firmly into position with a damp sponge.
8. Torch second top flashing sheet into position with edge tight into corner.
 - a. Cut off base tie-in selvage at 45° from vertical.
 - b. Press flashing firmly into position with a damp sponge.
 - c. Seal all edges with hot trowel and sprinkle granules to cover seeping asphalt.

3.26 CURBS

- A. Inspect and verify that all curbs are properly secured to deck, are level, a minimum 12" above finished roof, primed and ready to receive flashings.
- B. Base ply membrane to be run horizontally tight up against the vertical curb or cant as required.
 1. When base ply membrane is to act as temporary seal for an extended length of time, carry membrane up vertical surface a minimum of 1".
- C. Gusset to be fabricated 4" wide x 8" long with a 2" triangular tip.
 1. Install gusset onto corner using a torch and firmly pressing with a hot trowel.
 2. Set gusset with triangular tip on base ply and wrapping the corner a minimum 2" on each side.
- D. Install base ply flashing according to 3.10 of this section.
 1. Precut flashing to the total sum of the curb height, thickness plus 1" for inside curb securement and 4" tie-in along base with width to match that of curb plus 3" overlap on each end.
 2. Secure along inside of curb with roofing nails.
 3. Cut back corner base selvage at 45° angle from vertical.

- E. Install top ply as specified under 3.11 and 3.12 of this section.
 - 1. Precut flashing to the total sum of curb height plus 6" for base tie-in with width to match that of curb plus 3" overlap at each end.
 - 2. Set granules with heated trowel on all surfaces to receive flashing.
 - 3. Cut flashing flush with the top of curb and seal edges with heated trowel.
 - 4. Cut back corner base selvage at 45° angle from vertical.
 - 5. Firmly press flashing into position using damp sponge.
- F. Provide metal counter flashing.

3.27 ROOF EDGE

- A. Inspection: Verify that the roof edging installation will not disrupt other trades. Verify that the substrate is dry, clean and free of foreign matter. Report and correct any defects prior to any installations. Comply with the roof edging manufacturer's installation guide when setting the roof edging.
- B. Installation of Roof Edging System: Submit product design drawings for review and approval to the Architect before fabrication. When installing, use provided fasteners consistent with the manufacturer's instructions, suitable for the substrate to which it is being installed.
- C. The Contractor is fully responsible to check all as-built conditions and verify the manufacturer's roof edge details for accuracy to fit the wall assembly prior to fabrication. **Contractor's Note: Submitted roof edge details will accurately depict existing conditions and will be supplied to resolve existing conditions at no additional cost to the Owner.**
- D. Install base ply membrane as specified under this section. Carry membrane over roof edge a minimum of 3" and temporarily fasten using galvanized roofing nails.
- E. Install a continuous metal cleat (material) and edge as detailed.
 - 1. Prime all dissimilar surfaces prior to membrane or flashing installation.
 - 2. Flange on edge to be 4" minimum.
 - 3. Nail flange to decking or wood blocking at 4" center, staggered, 1" from outside edge.
- F. Cover edge with a reinforcing strip of base membrane torched into place. Membrane is to carry beyond the metal flange onto base ply a minimum of 4".

1. Hold the reinforcing strip back from outside edge of metal by 3/4".
 2. Seal all edges with a hot trowel.
- G. Install top ply of membrane according to 3.12 of this section with the edge tight against the metal and sealed with a hot trowel.

3.28 COPING/PARAPETS

- A. Verify all surfaces are properly secured and fully primed, ready to receive flashings.
- B. Base ply membrane is to run horizontally tight up to the vertical or cant as required.
- C. Install base ply flashing according to 3.11 of this section. Carry flashing up the vertical surface, over the top and down the outside face of the parapet a minimum of 3". Fasten along outside edge at 4" centers using roofing nails.
1. Install a continuous metal cleat (material) and edge as detailed.
 - a. Prime all dissimilar surfaces prior to membrane or flashing installation.
 - b. Flange on edge to be 4" minimum.
 - c. Nail flange to wood blocking at 4" center - staggered.
 2. Torch top ply membrane and flashing as detailed and specified under 3.11 and 3.12 of this section.

3.29 TESTING OF COMPLETED ROOFING SYSTEM

- A. Schedule flooding of roofs with the Owner. No flood testing will be allowed when buildings are occupied. Flood each area of roofing membrane with not less than a 2" depth of water. Include all areas sloped not over 1/4" per foot. Provide temporary dams where required. Leave in place 24 hours and examine substructure for evidence of leakage. Repair leaks and retest as before, until no leakage is observed.
- B. The roof manufacturer's representative shall witness the conducting of the positive drainage exercise, and sign-off on same.

3.30 POSITIVE DRAINAGE

- A. The General Construction Contractor or the roofing contractor (if separate prime contract) shall be responsible for installing the roof slope and drainage in accordance with N.R.C.A. standards. Additionally, the Contractor shall be responsible for the installation of structural steel, roof decking, roof drains, tapered insulation, perlite, crickets, roof plies, etc. in accordance with and to the tolerances indicated in the contract documents. **There**

should be no standing water on any portion of the entire roof surface 48 hours after a rainfall, during ambient drying conditions.

- B. The roof manufacturer's representative shall witness the conducting of the positive drainage exercise, and sign-off on same.

3.31 FIELD QUALITY CONTROL

- A. After all roofing system work is completed, provide a final inspection by the roofing system manufacturer's representative. Representative must be employed expressly as a technical employee and not concurrently in a sales role. The Representative is required to perform a roof inspection and issue a report citing all non-conformances that must be corrected. All non-conformance items must be completed before issuance of the required 20-Year No Dollar Limit (Edge to Edge) Warranty. Provide, via the representative, final documentation verifying that roofing system has been installed according to the Specifications.
- B. The Contractor must arrange for the roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect. Notify Architect or Owner 48 hours in advance of date and time of inspection.
- C. All work shall also be subject to inspection by Architect and Owner. Work found to be in violation of specifications or not in accordance with established workmanship practices and standards will be subject to complete removal and proper replacement with new materials at contractor's expense.
- D. The Contractor shall repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- E. Additional testing and inspecting, at the Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.32 PROTECTING AND CLEANING

- A. Clean up and remove daily from the site all wrappings, empty containers, paper, loose particles, and other debris resulting from these operations.
 - 1. Remove markings from finished surfaces. Restore all other building surfaces and areas affected by the roofing application to the same conditions of aforementioned on day of job start.
- B. Repair or replace defaced or disfigured finishes caused by work of this section.
- C. Protect the roofing system from damage and wear during the remainder of the construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and

damage, describing its nature and extent in a written report, with copies to Architect and the Owner.

- D. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- E. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- F. Keep newly installed roofing membrane clean and new in appearance under the assumption that all areas of roofing are aesthetically essential. Contractor may be directed to remedy and if no remedy available replace, newly roofed areas that are not maintained as such during the balance of installation.
- G. Provide traffic ways, erect barriers, temporary interior partitions and enclosures, fences, guards, rails, enclosures, chutes, and the like to protect personnel, roofs, and structures, vehicles and utilities.
- H. Plywood for traffic ways require for material movement over existing roofs shall not be less than 5/8" thick.
- I. In addition to the plywood listed above, an underlayment of minimum ½-inch recovery board is required on new roofing. Special permission must be obtained from the manufacturer before any traffic will be permitted over new roofing.

END OF SECTION

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07900 - CAULKING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

- A. The General Conditions accompanying these specifications shall apply to and bind all Contractors for the work.

1.02 SCOPE

- A. The work covered by this section of the specifications consists of furnishing all plant, labor, equipment, appliances, and materials and performing all operations in connection with the application of caulking complete, in strict accordance with this section of the specifications and the applicable drawings, and subject to the terms and conditions of the contract.

- 1. It is the intent of the caulking work under this Section to provide waterproof seals at all joints where shown on drawings.

1.03 APPLICABLE SPECIFICATIONS

- A. The following Federal Specification forms a part of this specification:
 - 1. TT-C-598 Compound, Caulking; Plastic (for Masonry and Other Structures.

1.04 QUALIFICATION

- A. Subcontract the caulking work only to a firm experienced in the application of the types of materials required, and employing skilled tradesmen for the work.

1.05 SUBMISSIONS

- A. Submissions shall be in accordance with Section 01300--Submissions, and as modified below.
- B. Manufacturer's Data, Sealants and Caulking:
 - 1. Submit three copies of manufacturer's specifications, recommendations, and installation instructions for each type of sealant, caulking compound, and associated miscellaneous material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the applications shown.
- C. Samples, Sealants and Caulking:

1. Submit three 12" long samples of manufacturer's standard colors for each type of sealant or caulking compound for selection by Architect.

Install sample between two strips of material similar to or representative of typical surfaces where sealant or compound will be used, held apart to represent typical joint widths. Samples will be reviewed by Architect for color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

D. Guarantee, Sealants:

1. Submit three copies of written guarantee agreeing to repair or replace sealants which 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 as in inherent quality of the material by submitted manufacturer's data. Provide guarantee for a period of two years, signed by the installer and Contractor.

PART 2 - MATERIALS

2.01 GENERAL

A. Materials shall conform to the following requirements:

1. Caulking Compound: Caulking compound shall conform to the requirements of Federal Specification TT-C-598, Grade I. The color of the caulking compound shall match the color of the new fascias. Delivery of the caulking compound to the building site shall be in the manufacturer's original sealed packages.

2.02 SAMPLES

- A. Samples, before the work of application is started, of all materials proposed for use, two (2) samples of each kind of caulking materials shall be submitted to the Architects for approval.

2.03 SEALANT MATERIALS

- A. Compatibility: Provide joint sealers, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions, as demonstrated by testing and field experience.
- B. Colors: Provide color of exposed joint sealers indicated or, if no otherwise indicated, as selected by Architect from manufacturer's standard colors. Color to match window frames.
- C. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated,

complying with ASTM C 920 requirements.

D. For exterior and interior caulking between aluminum and concrete masonry:

1. One-part, Non-acid Curing Silicone Sealant: Type S, Grade NS, Class 25, and as follows:
 - a. Uses NT, M, G, A, and O.
 - b. Additional capability, when tested per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of application and still comply with other requirements of ASTM C 920.
 - c. 40 percent movement in both extension and compression for a total of 80 percent movement.
2. Products offered by manufacturers to comply with the requirements include the following:
 - a. Dow Corning Corp., "Roofseal."
 - b. 795 Silicone Building Sealant.

E. For exterior and interior caulking between aluminum and aluminum:

1. One-part, Acid Curing Silicone Sealant: Type S, Grade NS, Class 25; Uses NT, G, A, and O.
2. Products offered by manufacturers to comply with the requirements include the following:
 - a. Dow Corning Corp., "Roofseal."
 - b. 795 Silicone Building Sealant.

2.04 ACCESSORY MATERIALS

A. Premolded Joints for Floors and Paving:

1. Rescor Expansion Joint (W. R. Meadows) or approved equivalent, 1/2-inch thick or as shown; leave 1/2-inch clear space at top to receive sealant.

B. Joint Cleaner:

1. Provide the type of joint cleaning compound recommended by the sealant or caulking compound manufacturer for the joint surfaces to be sealed.

C. Joint Primer:

1. Provide the type of joint priming compound recommended by the sealant or caulking compound manufacturer for the joint surfaces

to be sealed.

D. Bond Breaker Tape:

1. Polyethylene tape or other plastic tape as recommended by the sealant manufacturer to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape wherever applicable.

E. Sealant Backer Rod:

1. All joints shown or specified to be sealed or caulked shall be filled with a compressible backer rod of polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer; to control the joint depth for sealant placement, to break bond of sealant at bottom of joint, to form optimum shape of sealant bead on back side, and to provide a highly compressible backer which will minimize the possibility of sealant extrusion when joint is compressed.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Caulking compound shall be applied by the gun method using nozzles of proper sizes to fit the several widths of the joints. The type of gun shall be subject to approval by the Architects.
- B. Preparation: Caulking in joints shall be a minimum of 3/4-inch in depth and 1/4-inch in width unless otherwise indicated on the drawings.
- C. Caulking: The compound shall be driven into the joint grooves with sufficient pressure to force out all air and to solidly fill the joint grooves. Caulking, where exposed, shall be free of wrinkles and shall be uniformly smooth. Upon completion of the caulking, any caulked joints not entirely filled shall be roughened and filled as specified and the exposed surface tooled smooth.
- D. Cleaning: The surfaces of all materials adjoining caulked joints shall be cleaned of any smears of compound or other soiling due to the caulking application.

3.02 GUARANTEE

- A. All work under this section shall be guaranteed for a period of one (1) year from date of final payment. Should any portion develop imperfections due to faulty workmanship or materials, the Contractor shall repair or replace such portions without delay and at no cost to

the Owner.

3.03 STATEMENT OF NON-COMPLIANCE

- A. Wherever it is necessary to proceed with the installation of sealants or caulking compounds under conditions which do not fully comply with the requirements (because of time schedule difficulties or other reasons which the Contractor determine to be crucial to the project, prepare a written statement for the Owner's record (with copies to the Contractor and Architect) indicating the nature of the non-compliance, the reasons for proceeding, the extra or precautionary measures taken to ensure the best possible work, and the names of the individuals concurring with the decision to proceed with the work.

END OF SECTION

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07910 - JOINT SEALERS

PART 1 - GENERAL

1.01 GENERAL

- A. Joint sealant to be as per the schedule at the end of this section.
- B. Submissions: In addition to product data, submit the following:
 - 1. Samples of each type and color of joint sealer required.
 - 2. Certified test reports for joint sealers evidencing compliance with requirements.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. Compatibility: Provide joint sealers, joint, fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions, as demonstrated by testing and field experience.
- B. Colors: Provide color of exposed joint sealers indicated, or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.
- C. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated, complying with ASTM C 920-11 requirements.
 - 1. Two part pourable Polysulfide Sealant: Type M; Grade P; Class 12-1/2'; Uses T, M, G, A, and O.
 - 2. One part non-acid curing Silicone Sealant: Type S, Grade NS, Class 25, and as follows:
 - a. Uses NT, M, G, A, and O.
 - b. Additional capability, when tested per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of application and still comply with other requirements of ASTM C 920-11.
 - c. 40 percent movement in both extension and compression for a total of 80 percent movement.
 - 3. One part acid-curing Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and O.
 - 4. One part mildew resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and O; formulated with fungicide; intended for sealing interior joints with nonporous substrates

exposed to high humidity and temperature extremes.

- D. Acrylic Sealant: Manufacturer's standard one-part non-sag, solvent-release-curing, acrylic polymer sealant complying with ASTM C 920-11 for Type S, Grade NS; Uses NT, M, G, A, and O; except for selected test properties which are revised as follows:

Heat-aged hardness: 40-50.

Weight loss: 15 percent.

Max. cyclic movement capability: ± 7.5 percent.

- E. Acrylic-Emulsion Sealant: Manufacturer's standard, one-part, non-sag, acrylic, mildew-resistant, paintable, acrylic-emulsion sealant complying with ASTM C 834.

- F. Foamed-in-place Fire-Stopping Sealant: Two-part, foamed-in-place silicone sealant for use as part of a through-penetration fire-stop system for filling openings around cables, conduit, pipes, and similar penetrations through walls and floors, with fire-resistance rating indicated, per ASTM E 814; listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

- G. One-part Fire-Stopping Sealant: One part elastomeric sealant formulated for use as part of a through-penetration fire-stop system for sealing openings around cables, conduit, pipes, and similar penetrations through walls and floors, listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.

- H. Sealant Backings, General: Non-staining, compatible with joint substrates, sealants, primers, and other joint fillers; approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

- a. Either flexible, open-cell polyurethane foam or non-gassing, closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer.

2. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26°F (-15°C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth and otherwise contribute to optimum sealant performance.

3. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back of joint.

- I. Primer: As recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated.

- J. Accessory Materials for Fire-Stopping Sealants: Forming, joint

fillers, packing, and other accessory materials as required for installation of fire-stopping sealants.

PART 3 - EXECUTION

3.03 EXECUTION

- A. General: Comply with joint sealer manufacturer's instructions applicable to products and applications indicated.
- B. Elastomeric Sealant Installation Standard: Comply with ASTM C 1193-16 Standard Guide for use of Joint Sealants.
- C. Solvent-Release Curing Sealant Installation Standard: Comply with ASTM C 804.
- D. Latex Sealant Installation Standard: Comply with ASTM C 790.
- E. Acoustical Sealant Application Standard: Comply with ASTM C 919-12(2017) for use of joint sealants in acoustical applications.
- F. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire resistance ratings indicated.

JOINT SEALER SCHEDULE

JOINT SEALERS

DESCRIPTION OF JOINT CONSTRUCTION AND LOCATION WHERE SEALANT IS TYPICALLY APPLIED (SEE NOTE BELOW)

Two-part Pourable Urethane

Exterior and interior joints in Sealant horizontal surfaces of concrete; between metal and concrete, mortar, stone and masonry.

One-part Non-acid Curing

Exterior and interior joints in Silicone Sealant vertical surfaces of concrete and masonry; between concrete masonry or stone; between metal and concrete, mortar or stone; perimeters of metal frames in exterior walls; overhead or ceiling joints; and on interior of glazed curtain wall.

One-Part Acid-Curing Silicone

Exposed joints within glazed Sealant curtain wall framing system, skylight framing system and aluminum entrance framing system.

One-Part Mildew-Resistant

Interior joints in vertical Silicone Sealant surfaces of ceramic tile in toilet rooms, showers, and kitchens.

Acrylic Sealant

Exterior expansion joints in vertical surfaces of brick.

Acrylic-Emulsion Sealant

Interior joints in field-painted vertical and overhead surfaces at perimeter of elevator door frames, hollow metal door frames, gypsum drywall, plaster and concrete or concrete masonry; and all other interior locations not indicated otherwise.

Foamed-in-Place Fire-Stopping

Through penetrations in fire-Sealant resistance-rated floor and wall assemblies involving multiple pipes, conduits, etc.

One-part Fire-Stopping Sealant

Through penetrations in fire-resistance-rated floor and wall assemblies involving single pipes, conduits where joint widths are narrow and of uniform width.

Note: Install sealant indicated in joints fitting descriptions and locations listed as well as in locations identified by drawing designations in Column One above.

END OF SECTION

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07920 - PREFORMED JOINT SEALERS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work of this section shall include the installation of preformed/precompressed joint sealers into the entire length (both sides) of the existing expansion joints at areas indicated on the drawings.

1.02 RELATED WORK

- A. Caulking: Section 07900.

1.03 QUALITY ASSURANCE

- A. Use people thoroughly trained and specially skilled in the techniques of installation of sealants, who can demonstrate the ability to install joint sealants to the Architect's satisfaction.
- B. Installation of the joint sealant shall be in strict accordance with manufacturer's guidelines.

1.04 WARRANTY REQUIREMENTS

- A. Sealant material shall be warranted against defects for a period of ten years from the date of delivery for vertical applications and five years for horizontal applications.

1.05 SUBMITTALS

- A. Before delivery to the job site, submit sample of joint sealant for approval.

1.06 PROJECT CONDITIONS

- A. The joint configuration and the joint surface shall be as detailed in the drawings and accordance with the contract specifications. All known detrimental conditions shall be reported immediately in writing to the Architect.
- B. Verify the actual width of each joint to be sealed against the specified width to ensure compliance with the specified percentage of compression required. Ensure joint is wide enough in relation to expected movement.
- C. Verify available depth of seal to ensure sufficient depth of seal, especially where joint is wider than specified.
- D. Do not proceed with the installation of joint sealer if the joint is other than designed, until written notification of conditions is

submitted to the Architect, and a written acknowledgement with an order to proceed is provided by the Architect.

- E. Do not proceed with the installation of joint sealer under adverse weather conditions when joint to be sealed is wet or frozen or when temperatures are below or above the manufacturer's recommended limitations for installation. Consult the manufacturer for specific instructions before proceeding.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealant material to the site in the manufacturer's original, undamaged containers with wrapping intact.
- B. Storage of materials shall be in dry, enclosed area, off the ground at the room temperature of 68°F. Remove only the required amount for the installation. When ambient temperature is under 50°F, store the sealant at room temperature for at least 24 hours prior to installation.
- C. Precompressed sealant material shall be transported from storage areas to the location of the joint in the original wrapped containers.
- D. Precompressed sealant shall not be stored in direct sunlight at the joint location on site.

PART 2 - MATERIALS

2.01 ACCEPTABLE MANUFACTURERS

- A. Polytite "B", a compressed self-expanding polyurethane foam joint sealant composed of high-quality polyurethane foam impregnated with hydrophobic polymer waterproofing agent with a release agent on one surface to act as a bond breaker, to be used with a high quality caulk to serve as a dual sealant system, as manufactured by Polytite Manufacturing Corporation, Cambridge, MA, 02140, (800) 776-0930 or (617) 864-0930.
 - 1. For sealing against weather, moisture, vapors, sounds, air, dust, and drafts (e.g., horizontal and vertical expansion, compression and sheer joint movements and to remain flexible to move between similar and dissimilar construction materials. Material to be supplied in rolls or sticks compressed to approximately 1/4-inch smaller than the joint to be filled. The ratio of width to depth will be to the manufacturer's specification. (Refer to joint sizing or contact the manufacturer.)
 - 2. Composed of an open cell, non-reticulated, high quality polyurethane foam.
 - 3. Resistant to gasoline, diesel fuel, solvents, salts, industrial cleaners, corrosive vapors, jet fuel, skydrol, and acids.
 - 4. Joint design shall be determined by the Architect and/or Engineer based on:

a. Expected thermal movement.

- b. Expected volume change (shrink, creep, effect of post tensioning, etc.).
- 5. Tested physical properties characteristics:
 - a. Density: 10 lb./cu.ft.
 - b. Thermal Conductivity: 12,106 BTU (hr) (ft²) (*F/ft).
 - c. Bleeding: None.
 - d. Tensile Strength (ASTM D2406): 21.8 psi.
 - e. Resistance to compression set (ASTM D1564): Max. 2%.
 - f. Softening (ASTM D816): Surpasses 50C min.
 - g. Shear Strength: Min. 8N/cm³.
 - h. Mildew Resistance: Excellent.
 - i. Staining: None.
 - j. Flammability: Self-extinguishing UL 94HF-1.
 - k. Flash Point: 590F.
 - l. Outdoor exposure: Excellent resistance to UV light.
 - m. Accelerated aging (ASTM G53-77): 825 hours minor surface degradation.
- CAUTION: The temperature at the time of construction will determine the width of the working joint. Contract shall form the joint allowing for temperature variation.
- 6. Material performance requirements.
- 7. Prime: Where primer is required for installation.
- 8. Bond breaker: When the surface requires it.
- 9. Cleaning agents: When recommended by the manufacturer.

PART 3 - EXECUTION

3.03 PREPARATION

- A. All foreign materials, existing expansion joint materials, paint, oil, dirt, grease, and other debris shall be removed from area of installation to extent indicated on the drawings by method selected by contractor and approved by both the Architect and product manufacturer. Existing cleaned expansion joint must then be vacuumed or blown with compressed air before sealer installation.

3.02 INSTALLATION

- A. Perform work in strict accordance with manufacturer's guidelines.
- B. Install sealant material when temperatures are between -14°F to 95°F.
- C. Joint shall be clean, dry, free of grease, ice, frost, loose mortar, oil, and other foreign materials.
- D. Installation shall be in accordance with manufacturer's instructions for the materials.
- E. Installation shall accommodate related work.

3.03 CLEAN UP

- A. Remove all waste materials. Do not use the waste materials. Leave site to the satisfaction of the Architect/Owner.

END OF SECTION

DIVISION 8 - DOORS AND WINDOWS

08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Extent of standard steel doors and frames is indicated and scheduled on drawings.
- B. Finish hardware is specified elsewhere in Division 8.
- C. Building in of anchors and grouting of frames in masonry construction is specified in Division 4.

1.03 QUALITY ASSURANCE

- A. Provide doors and frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified.
- B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows," and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Oversize Fire-Rated Door Assemblies: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, provide certificate or label from an approved independent testing and inspection agency, indicating that door and frame assembly conforms to the requirements of design, materials, and construction as established by individual listings for tested assemblies.
 - 2. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 450°F (232°C) maximum in 30 minutes of fire exposure.

1.04 SUBMISSIONS

- A. Product Data: Submit manufacturer's technical product data substantiating that products comply with requirements.
- B. Shop Drawings: Submit for fabrication and installation of steel

doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

1. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.
 2. Indicate coordination of glazing frames and stops with glass and glazing requirements.
- C. Samples: Full range of color samples for Architect selection; 2 samples, 6" square minimum, of each color and texture selected for factory finished doors and frames.
- D. Label Construction Certification: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, submit manufacturer's certification for that each door and frame assembly has been constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work cartoned or crated to provide protection during transit and job storage. Provide additional sealed plastic wrapping for factory finished doors.
- B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4" high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames by one of the following:

1. Steel Doors and Frames, (General):

Allied Steel Products, Inc.
Amweld/Div. American Welding & Manufacturing Co.
Ceco Corporation.
Copco Door Company.
Curries Manufacturing, Inc.
Dittco Products, Inc.
Fenestra Corporation.

Kewanee Corporation.
Mesker Industries, Inc.
Pioneer Builders Products Corporation/Div. CORE Industries, Inc.
Steelcraft/Div. American Standard Company.
Trussbilt, Inc.
Republic Builders Products Corporation/Subs. Republic
Steel.

2.02 MATERIALS

- A. Hot-rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
- B. Cold-rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, with ASTM A 525, G60 zinc coating, mill phosphatized.
- D. Supports and Anchors: Fabricate of not less than 18 gauge galvanized sheet steel.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.
- F. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.
- G. Finish: For all doors indicated as prefinish, provide manufacturer's standard baking epoxy or enamel paint. All other doors to be finished as described in Division 9 - Section 09900.

2.03 FABRICATION, GENERAL

- A. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp, or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site. Comply with SDI-100 requirements as follows:
 - 1. Interior Doors: SDI-109, Grade II, heavy-duty, Model 1, minimum 18-gauge faces, and Model 5, minimum 16 gauge steel. Refer to door schedule for locations.
 - 2. Exterior Doors: SDI-100, Grade III, extra heavy-duty, Model 2, minimum 16-gauge faces, and Model 5, 16 gauge steel. Refer to door schedule for locations.
- B. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel.
- C. Fabricate frames, concealed stiffeners, reinforcement, edge channels,

louvers, and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).

- D. Fabricate exterior doors, panels, and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gauge inverted steel channels. Edge seams shall be welded, filled, and ground smooth.
- E. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.
- F. At exterior locations and elsewhere as shown or scheduled, provide doors which have been fabricated as thermal insulating door and frame assemblies and tested in accordance with ASTM C 236.
 - 1. Unless otherwise indicated, provide thermal-rated assemblies with U-factor of 0.24 BTU / (hr*ft sq deg F) or better.
- G. Finished Hardware Preparation: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
- H. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
- I. Locate finish hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware," published by Door and Hardware Institute.
- J. Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
- K. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
- L. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.
- M. Apply finish coat to doors indicated as prefinished by electrostatically spraying and baking, to produce a paint thickness of 1.25 mils.

2.04 STANDARD STEEL DOORS

- A. Provide metal doors of types and styles indicated on drawings or schedules.
- B. Provide sightproof stationary louvers for interior doors where indicated, constructed of inverted V-shaped or Y-shaped blades formed of 24-gauge cold-rolled steel set into 20-gauge steel frame.

2.05 STANDARD STEEL FRAMES

- A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16-gauge cold-rolled furniture steel.
- B. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.
- C. Plaster Guards: Provide 26-gauge steel plaster guards or mortar boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.
- B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions for Steel Frames," unless otherwise indicated.
 - 1. Except for frames located at in-place concrete or masonry and at drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 - 2. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels.
 - 3. At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices.
 - 4. Install fire-rated frames in accordance with NFPA Std. No. 80.
 - 5. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with tapping screws.
- C. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.
- D. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

3.02 ADJUST AND CLEAN

- A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.
- C. Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and incomplete and proper operating conditions.

END OF SECTION

DIVISION 8 - DOORS AND WINDOWS

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The extent and location of each type of wood door is shown on drawings and schedules.
- B. The types of doors required include the following:
 - 1. Solid core flush wood doors, with wood-veneer faces.
 - 2. Fire rated flush wood doors.
 - 3. Factory-finished flush wood doors.
- C. Related Sections:
 - 1. Section 08110 - Steel Doors and Frames.
 - 2. Section 08112 - Custom Steel Doors and Frames.
 - 3. Section 08710 - Finish Hardware.
 - 4. Section 08800 - Glass and Glazing.
 - 5. Section 09900 - Painting.
- D. Related Documents: Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 QUALITY ASSURANCE

- A. In addition to the requirements shown on the drawings and specified in this section, comply with the following standards:
 - 1. AWI "Quality Standards illustrated", Section 01300 and Brochure No. 5 "Flush Doors" of the Architectural Woodwork Institute.
 - 2. NWMA "Industry Standard I.S. 1-73 "Wood Flush Doors" of the National Woodwork Manufacturer's Association.
 - 3. NFPA 80 "Standard for Fire Doors and Windows" of the National Fire Protection Association.
 - 4. NWWDA "Guide to Door Face Veneers".
- B. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
 - 1. Provide AWI Quality Certification Labels, or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
- C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows," and

have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" & NFPA 252 "Standard Methods of Fire Tests of Door Assemblies" of the National Fire Protection Association by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1. Test Pressure: After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
 2. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450 deg. F maximum in 30 minutes of fire exposure.
- D. ASTM E119 "Standard Test Methods for Fire Tests of Building Construction Materials".

1.03 SUBMITTALS

- A. Comply with the requirements of Section 01300 and as modified below.
- B. Manufacturer's Data:
1. Submit six (6) copies of manufacturer's product data, specifications, and installation instructions for each type of wood door required. Data shall include details of core and edge construction and trim for openings. Include factory-finishing specifications.
 2. Submit six (6) copies of manufacturer's certificate indicating that doors and louvers meet, or exceed, requirements of indicated fire rating.
- C. Shop Drawings: Submit three samples, minimum 12" x 12", showing veneer, core, and edge construction for each type of wood door required. Indicate location, size, and hand of each door, elevation of each kind of door, construction details not covered in Product Data; location and extent of hardware blocking and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
 2. Indicate dimensions and locations of cutouts.
 3. Indicate requirements for veneer matching.
 4. Indicate doors to be factory finished and finish requirements.
 5. Indicate fire ratings for fire doors.
- D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
1. Faces of Factory-Finished Doors: Show the full range of options available for stained and transparent finishes.
- E. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

1. Frames for light openings, 6 inches long, for each material, type and finish required.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheet. Mark each door on top and bottom rail with opening number used in shop drawings.
- C. Protect wood doors during transit, handling, and storage to prevent damage, soiling, and deterioration. Store in a dry location and stack in accordance with manufacturer's instructions.
- D. Provide protective coverings for shop finished doors at the factory prior to shipping. Use heavy paper cartons and mark with identification required for proper installation.

1.05 QUALITY STANDARD

- A. Comply with NWWDA I.S. 1-A "Architectural Wood Flush Doors, and AWI's "Architectural Woodwork Quality Standards Illustrated".

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.07 WARRANTY

- A. Submit three copies of written agreement in door manufacturer's standard form signed by the manufacturer, installer, and Contractor agreeing to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup or twist) more than $\frac{1}{4}$ inch in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
- B. The warranty shall include refinishing and reinstallation which may be required due to repair or replacement of defective doors.
- C. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
- D. Warranty shall be in effect during the following period of time from date of Substantial Completion.
 - a. Solid-Core Interior Doors: Life of Installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design: The design for flush wood doors is based on Mohawk Flush Doors, Inc. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
1. Eggers Industries, Two Rivers, Wisconsin.
 2. Algoma Hardwoods, Inc., Algoma, Wisconsin.
 3. Marshfield Door Systems, Inc., Marshfield, Wisconsin.

2.02 INTERIOR FLUSH DOORS

- A. Comply with applicable requirements of AWI 1300.
- B. Face Veneer: Match existing veneer and finish, unless otherwise specified. Provide *"Mohawk Platinum Series 7-ply Architectural Flush Doors."*
1. AWI quality grade: Grade A, plain sliced white oak or maple, book match (match for color and grain) at veneer joints. Provide exposed edges or other exposed solid wood components of the same species as face veneer. Veneers are to be white only (color contract heartwood/sapwood) will not be acceptable).
 2. Faces for transparent finish: AWI Specification System 1 filled finish; match veneer of existing doors.
- C. Door Construction: Solid core, AWI Type Solid Composite Lumber Core (SCLC) for non-rated doors and 20 minute rated doors and/or Mineral Core (MC) for 45 minute, 60 minute and 90 minute rated doors. Five (5) plies with stiles and rails bonded to core; then entire unit to be abrasive-planed before veneering.
1. Special edge construction (for Mineral Core [MC] fire rated doors): 5" top rail; 5" bottom rail, and 5" x 18" lock blocks both sides. At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer. At pairs, furnish formed-steel edges and astragals for pairs of fire-rated doors, unless otherwise indicated. Provide finish steel edges and astragals with baked enamel same color as doors.
 2. Wood fire doors (similar or equal to Mohawk Platinum Series 7-ply Architectural Flush Doors) must be installed in a rated hollow metal (h.m.) frame (i.e., 3/4 hour - C labeled; 1-1/2 hour - B labeled). Door construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
 - a. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in

doors of fire ratings indicated:

1. 5-inch top-rail blocking.
 2. 5-inch bottom-rail blocking.
 3. 5-inch mid-rail blocking with 5-by-10-inch lock blocks.
- b. At pairs of fire-rated doors, provide fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals.
3. In accordance with NFPA-80, Section 1-7, Glazing Material, Fire protection rated glazing (vision panels) must be installed in approved steel frames.
- a. Glazing for openings through doors, such as ceramic fire rated safety glass, shall be fitted into trim openings and well embedded in putty.

D. Louvers:

1. Wood louvers: Provide door manufacturer's standard solid wood louvers, unless otherwise indicated; size indicated on drawings or in schedule.
2. Metal louvers: Unless otherwise specified provide minimum 20 gauge steel with prime and finish coats of enamel; color to match sample furnished by Architect; size as indicated on drawings or in schedule. Blade type to be vision-proof, inverted V. Metal and finish to be galvanized steel, 0.0396 inch thick, hot-dip zinc - coated and factory-primed for paint finish.
3. For fire-rated doors, louver must be fire rated with U.L. label and equipped with a (stainless steel) spring operated 160° fusible link and closing device, listed and labeled for use in doors with fire rating of one and one-half hours and less. Metal and finish to be galvanized steel, 0.0396 inch thick, hot-dip zinc coated and factory-primed for paint finish.
4. Where indicated to be lightproof, provide lightproof overlapping channel blade louvers, similar to the following:
 - a. "Model 1000 Lightproof Overlapping Channel Blade Louver" by Air Louvers, Inc.
 - b. "Model 619 Lightproof Formed Metal Stationary Louver" by AiroLite Co., Marietta, Ohio.
 - c. "Model LP-1 Lightproof Louver" by Wonder Metals Corp., Redding, Ca.

E. Wood Beads for Light Openings in Wood Doors:

1. Wood Species: Same as species as door faces.
2. Profile: Flush rectangular beads.
3. At 20-minute, fire-rated, wood-core doors, provide wood beads and

metal glazing clips approved for such use.

- F. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard wood-veneered non-combustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.
- G. Adhesives: Do not use adhesives containing urea formaldehyde.
- H. Doors for Transparent Finish:
 - 1. Grade: Premium, with Grade A faces.
 - 2. Species and Cut: Birch, plain sliced.
 - 3. Match between Veneer Leaves: Book match.
 - 4. Assembly of Veneer Leaves on Door Faces: Center balance match.
 - 5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 - a. Room Match: Match door faces within each separate room or area of building. Corridor door faces do not need to match where they are separated by 20 feet or more.
 - b. Stiles: Same species as faces.

2.03 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
 - 1. Comply with clearance requirements of referenced quality standard for fitting.
 - 2. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) for door(s) required.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Louvers: Factory install louvers in prepared openings.

2.04 FACTORY FINISHING

- A. General: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.
- B. Finish all door surfaces at factory.
- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI System, TR-6 catalyzed polyurethane.
 - 3. Staining: As selected by the Architect from the entire series of colors.
 - 4. Effect: Open-grain finish.
 - 5. Sheen: Semi-gloss.
- D. Restore finish on all edges of shop-finished doors before installation.
- E. Drips and runs of paint, stain, primer, or sealer are not acceptable.

2.05 FIRE RATED DOORS

- A. Comply with applicable requirements of AWI 1300 and NFPA 80 "Standard for Fire Doors and Windows" for fire ratings indicated on drawings and in schedule.
- B. Provide doors which have been tested and rated by Underwriter's Laboratories, Inc. (UL) for the fire ratings and class indicated in the schedule using single-point hardware.
 - 1. Attach UL classification Marking label indicating door type, rating, class, and temperature rise to edge of each fire-rated door.
- C. Provide veneer and finish to match non-fire-rated doors in the same area of building, unless otherwise indicated.
- D. Door assemblies in corridors and smoke barriers shall be tested in accordance with NFPA 252 or UL 10C

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and installed door frames prior to hanging doors.
 - 1. Verify that framed comply with indicated requirements for type, size, location and swing characteristics and have been installed with level heads and plumb jambs.
- B. Proceed with installation, only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Condition doors to average prevailing humidity in installation area

prior to hanging.

- B. Fit doors to frames and machine for hardware.

3.03 INSTALLATION

- A. Install wood doors in accordance with manufacturer's instructions. Adjust for proper fit, uniform clearance at each edge, and smooth balanced door movement. For installation of finish hardware, refer to Section 08710.
- B. Provide clearance for doors of 3/32" at jambs and heads and 3/8" at bottom, unless otherwise indicated.
 - 1. For fire rated doors, provide clearances complying with the limitation of the authority having jurisdiction. Install fire-rated doors into corresponding fire-rated frames, according to NFPA 80.
 - 2. Allow extra clearance as required for thresholds, carpet, and similar materials.
- C. Job-fitted use: Align and fit doors in frames with a uniform clearances and bevels as indicated below. Do not trim stiles and rails in excess of limits set by the manufacturer or permitted for fire-rated doors. Machine doors for hardware; seal cut surfaces after fitting and machining.
- D. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
- E. Comply with NFPA 80 for fire-rated doors.
- F. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- G. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- H. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.04 ADJUSTING

- A. Operation: Re-hang or replace doors what do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with the requirements and shows no evidence of repair or refinishing.

END OF SECTION

DIVISION 8 - DDORS & WINDOWS

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Mechanical and electrified door hardware
 - 2. Field verification, preparation and modification of existing doors and frames to receive new door hardware.
- B. Section excludes:
 - 1. Windows
 - 2. Cabinets (casework), including locks in cabinets
 - 3. Signage
 - 4. Toilet accessories
 - 5. Overhead doors
- C. Related Sections:
 - 1. Division 01 Section ''Alternates'' for alternates affecting this section.
 - 2. Division 06 Section ''Rough Carpentry''
 - 3. Division 06 Section ''Finish Carpentry''
 - 4. Division 07 Section ''Joint Sealants'' for sealant requirements applicable to threshold installation specified in this section.
 - 5. Division 08 Sections:
 - a. ''Metal Doors and Frames''
 - b. ''Flush Wood Doors''
 - 6. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.

1.02 REFERENCES

- A. UL - Underwriters Laboratories
 - 1. UL 10B - Fire Test of Door Assemblies
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies
 - 4. UL 305 - Panic Hardware
- B. DHI - Door and Hardware Institute
 - 1. Sequence and Format for the Hardware Schedule
 - 2. Recommended Locations for Builders Hardware
 - 3. Keying Systems and Nomenclature

4. Installation Guide for Doors and Hardware
- C. NFPA - National Fire Protection Association
1. NFPA 70 - National Electric Code
 2. NFPA 80 - 2016 Edition - Standard for Fire Doors and Other Opening Protectives
 3. NFPA 101 - Life Safety Code
 4. NFPA 105 - Smoke and Draft Control Door Assemblies
 5. NFPA 252 - Fire Tests of Door Assemblies
- D. ANSI - American National Standards Institute
1. ANSI A117.1 - 2017 Edition - Accessible and Usable Buildings and Facilities
 2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
 3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
 4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
 5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, 'EXAMINATION' article, herein.
 - b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

3. Door Hardware Schedule:

- a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
- b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
- c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

4. Key Schedule:

- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
- b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule
 - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. fire door assemblies, in compliance with NFPA 80.
 - b. required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.

2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
 - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
 - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
3. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in ''REFERENCES'' article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference

- a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.

2. Pre-installation Conference

- a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- b. Inspect and discuss preparatory work performed by other trades.
- c. Inspect and discuss electrical roughing-in for electrified door hardware.
- d. Review sequence of operation for each type of electrified door hardware.
- e. Review required testing, inspecting, and certifying procedures.
- f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:

- a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks
 - a) Schlage ND Series: 10 years
 - 2) Exit Devices
 - a) Von Duprin: 3 years
 - 3) Closers
 - a) LCN 4000 Series: 30 years

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: ''No Substitute.''
- 1. Where ''No Substitute'' is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of manufacturers and/or products other than those listed as ''Scheduled Manufacturer'' or ''Acceptable Manufacturers'' in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- C. Approval of products from manufacturers indicated in ''Acceptable Manufacturers'' is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fabrication
 - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
 - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 - 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.
 - 1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
 - 2. Use materials which match materials of adjacent modified areas.

3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.
- C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Ives

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.04 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

- a. Schlage L9000 series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.

2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to ''KEYING'' article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Provide motor based electrified locksets that comply with the following requirements:
 - a. Universal input voltage - single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
 - b. Fail Safe/Fail Secure - changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
 - c. Low maximum current draw - maximum 0.4 amps to allow for multiple locks on a single power supply.
 - d. Low holding current - maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - e. Connections - provide quick-connect Molex system standard.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.

2.05 CYLINDRICAL LOCKS - GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage ND series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to 'KEYING' article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - b. Lever Design: <INSERT LEVER DESIGN>.

2.06 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 98/35A series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to 'KEYING' article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.

9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Special Options:
 - a. SI
 - 1) Provide dogging indicators for visible indication of dogging status.
 - b. XP
 - 1) Rim Exit Devices: provide devices with non-tapered smart latchbolt with 90° latchbolt to strike engagement under stress and Static Load Resistance of 2000 pounds.
 - c. QM
 - 1) Rim Exit Devices: provide devices with damper-controlled re-latching to reduce operational noise. Where lever trim is specified, provide damper controlled lever return.
 - d. HH
 - 1) Provide wind and impact rated hurricane exit devices and mullions certified to comply with Florida Building Code (FBC) TAS 201, 202, 203.
 - e. HW
 - 1) Provide wind rated hurricane exit devices and mullions certified to comply with ANSI-ASTM E330.
 - f. CX

- 1) Provide delayed egress devices, where scheduled, that are UL 294 listed, meet National Fire Protection Association (NFPA) and International Building Code (IBC) governing delayed egress, and/or other local and national fire codes acceptable to authority having jurisdiction as required.
 - a) Provide non-handed and field sizable device with 3/4 (19mm) throw deadlocking latch bolt. Device incorporates an internal RX switch that detects attempt to exit from applying less than 15lbs to the push pad, which causes this switch to start an irreversible alarm cycle. Key switch in device is capable of arming, disarming, or resetting the device; and indicator lamp determines status of the device.
 - b) Provide devices capable of standard 15 second release delay and indefinite release delay as required by code, when tied into fire alarm system will release immediately when an alarm condition exists.
 - c) Provide devices with all control inputs - door position input, external inhibit input, fire alarm input; auxiliary locking; nuisance alarm and internal horn; and, remote signaling output self-contained in the device assembly.

2.07 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage Everest 29 R
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Conventional Patented Restricted Small Format: cylinder with small format interchangeable cores (SFIC) with restricted, patented keyway.

3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.08 KEYING

A. Scheduled System:

1. Existing factory registered system:
 - a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
 - a. Replaceable Construction Cores.
 - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - a) 3 construction control keys
 - b) 12 construction change (day) keys.
2. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - 3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
 - d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.

- 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
- e. Quantity: Furnish in the following quantities.
- 1) Change (Day) Keys: 3 per cylinder/core.
 - 2) Permanent Control Keys: 3.
 - 3) Master Keys: 6.

2.09 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4010/4110/4020 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.

9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.10 ELECTRO-MECHANICAL CLOSER/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:

- a. LCN

B. Requirements:

1. Provide single-point or multi-point hold-open electro-mechanical closer/holders as specified. Coordinate voltage requirements and provide transformer if necessary.
2. Provide closer/holders that function as full rack and pinion door closer when current is interrupted or continuous hold-open is not engaged.
3. Provide door closers with fully hydraulic, full rack and pinion action with high strength cylinder and full complement bearings at shaft.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.11 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Ives

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.12 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Ives

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.13 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:

- a. Glynn-Johnson

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.14 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Ives

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.

2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.15 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.16 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide "'push-in'" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.17 MAGNETIC HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:

a. LCN

B. Requirements:

1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.18 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
 - 3. Furnish permanent cores to Owner for installation.
- J. Lead Protection: Lead wrap hardware penetrating lead-lined doors. Line levers and roses with lead. Apply kick and armor plates on lead-lined doors with adhesive as recommended by manufacturer.
- K. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.

- L. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- M. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- N. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- P. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION


- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:









67136 OPT0247538 Version 1

Legend:

 Link to catalog cut sheet









HARDWARE SET NO. 01 - SINGLE CLASSROOM SECURITY

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM SECURITY	ND75BDC RHO XN12-035		626	SCH
2	EA	SFIC EVEREST CORE	80-037 CKC EV29 R		626	SCH
1	EA	SURFACE CLOSER	4011		689	LCN
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER









HARDWARE SET NO. 01A - SINGLE CLASSROOM SECURITY

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	CLASSROOM SECURITY	ND75BDC RHO XN12-035		626	SCH
2	EA	SFIC EVEREST CORE	80-037 CKC EV29 R		626	SCH
1	EA	OH STOP	90S		630	GLY
1	EA	SURFACE CLOSER	4011		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER









HARDWARE SET NO. 02 - PAIR EXITS LOCKDOWN

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
2	EA	CONT. HINGE	224XY		628	IVE
2	EA	FIRE EXIT HARDWARE	9827-L-F-2SI-LBRAFL-06-499F		630	VON
4	EA	SFIC RIM CYLINDER	80-116		626	SCH
4	EA	SFIC EVEREST CORE	80-037 CKC EV29 R		626	SCH
2	EA	SURFACE CLOSER	4111 EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	MAGNET	SEM7830 12V/24V/120V		689	LCN
1	EA	GASKETING	188SBK PSA		BK	ZER

HARDWARE SET NO. 03 - PAIR EXITS - MAG HOLD OPEN







Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
2	EA	CONT. HINGE	224XY		628	IVE
2	EA	FIRE EXIT HARDWARE	9827-L-BE-F-LBRAFL-06-499F		630	VON
1	EA	FIRE/LIFE HOLDER	4040SEH 24V/120V AC/DC AS REQ		689	LCN
1	EA	SURFACE CLOSER	4111 CUSH		689	LCN
1	EA	SURFACE CLOSER	4111 EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	MAGNET	SEM7830 12V/24V/120V		689	LCN
1	EA	GASKETING	188SBK PSA		BK	ZER

NOTE: 4040SEH HOLDER AND STOP ARM CLOSER MUST BE TEMPLATED TO SAME DEGREE OF OPENING OTHERWISE DAMAGE MAY OCCUR TO HOLDER IF FORCED BEYOND ITS LIMIT.


HARDWARE SET NO. 04 - SINGLE PRIVACY

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	PRIVACY LOCK	L9040 06A L583-363 L283-722		630	SCH
1	EA	MOP PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

HARDWARE SET NO. 05 - PAIR BI-PASS

Provide each BP door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
1	EA	BY-PASS TRACK	CC-500			KNC
2	EA	FLUSH PULL	950		626	IVE

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09102 - PLASTER (OVER CMU - INTERIOR)

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Accessories, cornerite, corner beads, and casing beads as required.
- B. Gypsum plaster finish where indicated on the drawings and as specified herein.
- C. Drawings and General Provisions of the Contract, including General Conditions and Supplementary Conditions and Division 1 specification section, apply to work of this section.

1.02 RELATED WORK UNDER OTHER SECTIONS

- A. Finish painting.

1.03 SUBMISSIONS

- A. Submit to the Architect for approval samples as described in General and Supplementary Conditions and do no work and order no materials prior to written approval. Installed work must conform exactly to approved samples.
- B. To avoid unnecessary samples, only those described below will be requested. However, as part of the Contract, when requested by the Architect, additional samples are to be promptly submitted.
- C. Identify completely all samples. Describe material, gauge, size, treatment, texture, finish, where to be used, and color or colors when applicable. Include names of project, Architect, Contractor, vendor, and manufacturer.
- D. Submit in duplicate:
 - 1. Sample panels (each finish): 12" x 12".

1.04 APPLICABLE STANDARDS

- A. Conform to referenced standards as applicable and as modified herein.
 - 1. Gypsum plastering - American Standards Association ASA-A42.1.
- B. Install items not covered by above standards or herein in accordance with manufacturer's directions.
- C. Conform to applicable standards:
 - 1. Gypsum plaster - ASTM C150, Type 1.

2. Lath - Expanded galvanized (self-furring) bearing sheet, 3.4 lbs./sq.yd.

3. Cornerite and strip lath - 2.5 lb. Galvanized diamond-mesh.
 - a. Strip lath 3" wide.
 - b. Cornerite 3" each leg.
4. Corner Beads - 26 gauge galvanized expanded mesh flange, 1/8-inch radius bullnose.
5. Expansion Joints or Accordion Pleats - Stainless steel, exterior use; galvanized elsewhere.
6. Tie Wires - .062 diameter monel or stainless steel.
7. Quick Lime - Conform to ASTM C-5.
8. Hydrated Lime - Conform to ASTM C-207.
9. Keene's Cement - Conform to ASTM C-28.
10. Sand - Conform to ASTM C-35, except for Stucco ASTM C144 White.
11. Stucco - Mill prepared, U.S. Gypsum, color as selected by the Architect.
12. Fiber - Goat, cattle, or pure manila as recommended by the Architect.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Materials for plaster work shall be standard products of the United States Gypsum Co., National Gypsum, or Bestwall and shall be subject to approval of the Architect.
- B. The directions of the manufacturer of materials approved for use by the Architect are hereby incorporated in and made a part of this Specification in all cases subject to the approval of the Architect. When manufacturer's directions are at variance with the provisions of the Standards for Stucco Plastering of the American Standards Association, ASA A42.1-1964, the more stringent requirements as to utility, durability, function, and appearance shall govern the work. Any variations shall be brought to the Architect's attention and no further construction of the disputed material or method shall proceed without the approval of the Architect.

2.04 DELIVERY AND STORAGE

- A. Upon delivery to the job site, store lathing and plaster materials in a dry, ventilated space off the ground and under cover.
- B. Deliver materials for use in plastering with the exception of sand and water in sealed containers or bags bearing the name brand of the approved manufacturer.

PART 3- EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Examine all surfaces to be plastered before starting any work and ascertain any discrepancy or conditions that may affect or prevent production of a satisfactory job in plastering.

3.02 INSTALLATION

- A. Furnish and install corner beads on horizontal and vertical external corners in plastered surfaces.
 - 1. Fabricate corner beads of galvanized No. 26 U.S.S. gauge sheet metal with small bead and with combination expanded and solid wings, 2-1/2" long, Milcor Super-ex or equivalent products of plaster manufacturers.
 - 2. Install corner beads 12 feet and under in length in one piece. Set plumb or level as required flush with finished plaster and fasten securely along each wing at intervals at 6 inches in a manner not dependent on the plastering.
- B. Furnish and install casing beads as required and as follows:
 - 1. Make casing beads of No. 24 U.S.S. gauge tight coat galvanized steel and provide with integral 3" expanded metal wing. Use Milcor No. 66 expansion wing casing or equivalent products of the plaster manufacturer and with bead having sufficient depth to receive the required thickness of plaster.
 - 2. Install casing beads 10 feet and under in length in one piece. Set plumb or level as required flush with finished plaster and fasten securely at intervals of 6" in a manner not dependent on the plastering.
- C. Plastering:
 - 1. Surfaces to receive plaster shall be clean and free from loose material and all foreign or objectionable matter. The installation of any plaster will be construed as acceptance of the surfaces or work to receive plaster, and the Contractor shall be responsible for any subsequent discoloration of plaster by rust or cleaning or plaster from contiguous work that may be required. The Contractor shall therefore ensure the protection of all fixtures, frames, inserts, and other metal against rust or soiling as the result of plastering operations.
 - 2. Plaster work shall be installed in a three (3) coat application: scratch coat, brown coat, and finish coat for an overall 5/8" thick plaster coat. The specified finish coat shall be laid out so as to permit the completion of an entire panel in one operation to avoid unsightly jointing. Particular attention shall be given to the curing requirements described in the referenced standards.

3. All internal vertical and horizontal masonry corners to be plastered including connections to the existing plaster surfaces shall be continuously reinforced with corner lath. All external corners shall be protected with corner beads. Continuous strip lath shall be installed at the junction of dissimilar materials to be plasters. Reinforce corners of openings in block walls with diagonal strip lath.
4. Finish Coats:
 - a. Keene's Cement - Extra hard finish.

3.03 PROTECTION, CLEANING, AND PATCHING

- A. Protect fixtures, frames, inserts, and other metal against rust or soiling as the result of plastering operations. Provide temporary closures for openings in rooms to be plastered.
- B. Protect plaster against freezing, premature drying, damage, marking, marring, or other defacing. Avoid soiling or spattering plaster on other parts of the building construction. Plaster on surfaces which are not required to be plastered shall be removed. Clean floors of plaster and debris, and leave broom clean.
- C. Cutting, patching, repairing, and pointing up due to construction operations shall be thoroughly and neatly performed. Cutting, reinforcing and fitting around outlets, piping fittings, conduit, ducts, and other items extending through furred and lathed surfaces shall be provided as required. Cracks and indentations in plastered surfaces shall be thoroughly raked out or cut out, the surfaces around fixtures, outlet boxes, switch plates, fitting, piping, tile, and other materials or appliances abutting or extending into plaster shall be pointed-up and finished flush with the adjacent plaster. Where plaster shall be beveled to a plane so that the joint assumes approximately a 45-degree angle.

3.04 GUARANTEE

- A. Work showing any defects within the guarantee period covered by Contract Documents shall be corrected as directed by the Architect. These shall include, but are not limited to, the following:
 1. Cracking.
 2. Discoloration.
 3. Dusting, disintegration, or defective adhesion to masonry or undercoats.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09221 - LATH AND CEMENT PLASTER

PART 1 - GENERAL

1.01 REQUIREMENTS

- A. Section includes: Metal furring, lathing, and cement plastering at entry soffit.
- B. Related Sections:
 - 1. General Requirements: Division 1.

1.02 QUALITY ASSURANCE

- A. References: American National Standards Institute (ANSI) Specifications for "Portland Cement and Portland Cement-Lime Plastering, Exterior (Stucco) and Interior", ANSI A42.2, and "Lathing and Furring for Portland Cement and Portland Cement-Lime Plastering, Exterior (Stucco) and Interior", ANSI A42.3.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Channels: Cold rolled steel, 16 gauge, asphaltum coated.
 - 1. Main runner: 1 1/2" (38 mm), 475 lbs./1,000 feet.
 - 2. Cross furring channels: 3/4" (19 mm), 300 lbs./1,000 feet.
- B. Furring Channels: Minimum 25 gauge galvanized sheet steel.
- C. Hangers:
 - 1. Wire: Galvanized, annealed steel wire, 9 gauge.
 - 2. Rod: Cold drawn, mild steel, asphaltum coated, 1/4" (6 mm) diameter.
 - 3. Strap: Flat mild steel, asphaltum coated, 3/16" x 1" (5 mm x 25 mm).
- D. Metal Lath: Galvanized.
 - 1. Supports: 16" o.c. Use:
 - a. Diamond mesh, 3.4 lbs./sq. yd. or
 - b. 1/8" flat rib lath, 2.75 lbs./sq. yd.

2. Supports: 24" o.c.: 3/8" rib lath, 3.4 lbs./sq. yd.
- E. Tie Wire: Galvanized soft-annealed steel wire, 14 gauge.
- F. Fasteners: Clips, screws, nails, staples as recommended by the manufacturer of the lath system.
- G. Accessories: Corner beads, casing beads, expansion joints, and screeds--not less than 26 gauge galvanized steel.
- H. Cement:
1. Portland cement: ASTM C150, Type 1.
 2. Masonry cement: ASTM C91.
- I. Special Finishing Hydrated Lime: ASTM C206, Type S.
- J. Glass Fibers: Alkali-resistant, 1/2" long glass fiber (AR Glass) equal to "Dur-O-Fibar" as manufactured by Dur-O-Wal, Inc., Northbrook, Illinois.
- K. Water: Potable, free from substances harmful to plaster.
- L. Aggregates: ASTM C144.
1. Base coat gradation:

<u>U.S. Standard Sieve</u>	<u>% Retained by Wt. (±2%)</u>	
	<u>Minimum</u>	<u>Maximum</u>
No. 4	---	0
No. 8	0	10
No. 16	10	40
No. 30	30	65
No. 50	70	90
No. 100	95	100

2. Finish coat gradation: Same as basecoat gradation except that all sand to pass No. 8 (2.36 mm) sieve.

2.02 PROPORTIONING AND MIXING

- A. Base coat(s): 1 part masonry cement (by volume), 3 to 5 parts aggregate.

Add glass fibers in the mix for base coats (scratch and brown coats) at rate of one package fibers per bag of cementitious material.

- B. Finish coat: 1 part masonry cement, 3 parts (max.) aggregate.

PART 3- EXECUTION

3.01 APPLICATION

A. Metal Lath and Furring: Comply with ANSI A42.2 and A42.3, as shown on the drawings, and as specified herein.

B. Cement Plaster: Comply with ANSI A42.2 and as specified.

1. Moist cure each basecoat and allow each coat to slowly dry for minimum period of 48 hours.
2. Allow basecoat to cure for minimum 7 days prior to application of finish coat.
3. Evenly dampen basecoat, to ensure uniform suction, and apply finish coat.
4. Moist cure finish coat for minimum period of 48 hours.
5. Nominal thicknesses and number of coats:

On Metal Reinforcement (3 coats):

	<u>Horizontal</u>
First coat	3/8"
Second coat	3/8"
Finish coat	1/8"

3.02 FINISH TEXTURE

A. Stucco to be finished in a sand texture as approved by the Architect.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09250 - GYPSUM WALLBOARD

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work of this section is subject to all applicable provisions of the "General Conditions" and "Division 1 - General Requirements" which form part of this specification.
- B. Provide all labor, materials, equipment, and services and perform all operations required to complete the installation of all work of this section and related work as indicated on the drawings and specified herein, including, but not necessarily limited to, the following:
 - 1. Gypsum wallboard.
 - 2. All trim, battens, corners, and similar items.
 - 3. All required fastenings, framing, and attachments.
 - 4. All adhesive, tapes, and joint compound systems as required.
 - 5. Wall to wall corner expansion joint.

1.02 RELATED WORK

- A. Related work specified under other sections of the specifications:
 - 1. Section 09510 - Acoustic Ceiling Systems.
 - 2. Section 09900 - Painting.

1.03 QUALITY ASSURANCE

- A. To assure compatibility, studs, runner track, clips, etc. shall be the product of the same manufacturer.
- B. Comply with the minimum requirements of the following except where more stringent requirements are specified herein. All gypsum wallboard shall be asbestos free.
 - 1. Gypsum wallboard: ASTM C-1396
 - 2. Joint treatment: ASTM C-475/C475M.
 - 3. Non-load bearing steel studs, runners, and rigid furring channels for screw attachment of gypsum wallboard: ASTM C-645.

1.04 SUBMITTALS

A. Samples:

1. Submit samples for the Architect's approval in accordance with the applicable provisions of the contract documents.
2. Submit three (3) samples of each of the following:
 - a. Gypsum wallboard: 12" by 12" each type and finish.
 - b. Trim: 6" lengths of each type and finish.
 - c. Compound: 1 pint cans.
 - d. Tape: 12" lengths.
 - e. Screws and fastenings: Each size and type.
 - f. Submit shop drawings and engineering calculations for special areas as requested by the Architect.

1.05 DELIVERY, STORAGE, AND HANDLING

- ##### A.
- Deliver all materials in unopened, original containers bearing manufacturer's labels. Store materials in a clean, dry, protected place and do not leave exposed to weather. Handle all materials with proper care to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Gypsum Wallboard Types:

1. Regular gypsum board and Type X gypsum board: Thickness as shown on the drawings, with long edges tapered on the face side, conforming to ASTM C-1396 and manufactured by U.S. Gypsum, National Gypsum, Georgia Pacific, or approved equal.
2. Hi-Impact 2000 Wallboard (Regular and Type X): Thickness shall be 5/8" th. Gypsum core is encased in heavy natural-finish paper of face side and strong liner paper on the back side. Lexan film is bonded to back side to provide additional impact/penetration resistance. Long edges are tapered to allow joints to be reinforced and concealed, conforming to ASTM C-1396 and Fed. Spec. SS-L-30D and manufactured by National Gypsum Co., or approved equal by the Architect.

B. Adhesive: USG Durabond 90.

C. Metal trim: All 25 gauge, manufactured by U.S. Gypsum under the following numbers or approved equal:

1. Corner beads: No. 25 gauge "Dura-Bead".

- 2. Casings: No. 400.
- 3. Control joints: No. 093.
- D. Studs and stud tracks: Standard 20 gauge non-load bearing channel shape, formed from galvanized steel, with widths as required and as manufactured by National Gypsum, U.S. Gypsum, or approved equal.
- E. Galvanized ceiling and wall furring channels: 1-3/8" face x 7/8" deep as manufactured by U.S. Gypsum or approved equal. "Z" furring channels, 26 gauge hot dipped galvanized, 1-1/2" deep as manufactured by U.S. Gypsum or approved equal.
- F. Tape and joint compound: Manufactured by the approved manufacturer of the gypsum board.
- G. Screws and other fastenings: Of a type recommended by the manufacturer for the particular purpose intended.
- H. Wall to wall (corner) expansion joint: Wabo ECC-200 corner coverplate, aluminum alloy 6063-TS or 6061-T6, mill finish. Paint as per Section 09900.

PART 3- EXECUTION

3.01 ERECTION OF METAL STUDS

- A. Align all partitions accurately according to layout. Runners shall be attached to concrete slab or other type of floor 24 inches on center with concrete stud nails or power-driven anchors, to suspended ceilings with toggle bolts, or to slab above where indicated.
- B. Position studs vertically in runners, spaced 16 inches on center maximum.

Anchor all studs adjacent to door frames and at partition intersections and corners, to runner flanges with metal lock fasteners, or positive screw engagement through each stud and runner flange.

When necessary, studs shall be spliced by nesting 2 studs with a minimum lap of 8 inches, attaching flanges with 2 screws per flange.
- C. Provide horizontal bracing of studs at mid-point in partition height. Bracing shall be standard metal stud cut to fit and secured to studs.
- D. Metal studs at door frames shall be erected 2" maximum from frames and as follows:
 - 1. Anchor door frame clips to studs securely by bolt or screw attachment.
 - 2. Doors 2'-6" and wider shall be framed with double studs, placed back to back.

3. Over door frames, install a section (cut to length) of runner with slip flanges and bent web to allow flanges to overlap adjacent vertical studs; screw attach all components.
 4. Position a stud at the locations of vertical joints in wallboard over door frames. Stud shall extend from frame header to the ceiling runner.
- E. Unless otherwise indicated or specified, the suspension system for gypsum board ceilings and soffits shall consist of runner channels and furring channels, suspended by hanger bars or hanger rods.

3.02 WALLBOARD INSTALLATION

- A. Unless otherwise specified, methods of installation shall be in accordance with the requirements of the Gypsum Association and the approved manufacturer.
- B. Stockpile wallboard, flat on floor in piles. Leave in original wrappings or containers until ready for use. Protect wallboard from moisture from any source.
- C. Butt all wallboard joints loosely together with a 1/4" cap. Butt ends shall not be placed against tapered edges.
- D. Install in maximum practical lengths to span walls without butt joints. If butt joints do occur, stagger joints and locate as far as possible from center of walls.
- E. Support end joints on studs. Apply end joint compound to the back of the board along end joints.
- F. No end joints shall align with edges of openings. Install expansion and/or control joints where shown or required.
- G. Install metal trim at corners, edges, and elsewhere as shown in accordance with the manufacturer's instructions and recommendations.
- H. Openings cut in wallboard to fit mechanical and electrical items shall fit snugly and be small enough to be covered by escutcheons and plates. Both face and back paper shall be cut when cutouts are not made with a saw.
- I. Adhesive and joint finishing compounds shall be mixed in strict accordance with the manufacturer's instructions. Mix only enough at one time to be used during the recommended pot life of the compound.
- J. Fasteners shall be installed as follows:
 1. Install no closer than 3/8-inch to end or edge.
 2. Begin from center of wallboard and proceed to outer edge.
 3. Pressure shall be applied on wallboard adjacent to fasteners being driven to ensure a tight fit of wallboard to the studs.

- K. Drive screws with a power screw driver as recommended by the manufacturer. Surface of head shall finish below the surface of the paper without puncturing the paper.
- L. Minimum temperature in areas where gypsum board is to be installed shall be 65°F for 24 hours before, during, and after installation. Provide adequate heat and ventilation to remove any moisture.
- M. Install continuous sound absorbing blanket in partitions indicated on drawings. Installation shall be in accordance with manufacturer's directions. Sound absorbing blanket insulation shall be paperless, semi-rigid mineral fiber batts 1" thick "Thermafiber" sound attenuation blanket, flame spread rating of 15 (ASTM E-84) as manufactured by U.S. Gypsum or approved equal.

3.03 JOINT TREATMENT

- A. Execute joint treatment in accordance with the manufacturer's printed instructions and these specifications.
- B. Reinforce wall corners and angles with tape folded to conform to the contour and embed in compound.
- C. Flanges of corner beads and trim shall be concealed by 2 coats of compound. Feather cut compound 9 inches from beads.
- D. Sand compound when thoroughly dry; avoid roughing surfaces of finish wallboard.
- E. Leave all surfaces smooth and uniform, ready to receive paint.

3.04 PATCHING AND REPAIRING

- A. After trim is applied, correct all surface damage and defects as required, to the Architect's satisfaction, so that blemishes will not show through the decoration.
- B. If, in the opinion of the Architect, the wallboard is irreparable, the Contractor shall remove same and replace it with new material at no extra cost to the Owner.

3.05 INSPECTION

- A. Wall surface, when prepared for painting, shall be inspected and approved by the Architect before proceeding further.

END OF SECTION

DIVISION 9 - FINISHES

Section 09300 - CERAMIC/PORCELAIN TILE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, equipment and services and perform all operations required to complete the installation of all work of this Section and related work as indicated on the drawings and specified herein, including, but not limited to, the following:
 - 1. Ceramic tile floors, bases, and walls in rooms and spaces indicated on Finish Schedule on drawings.
 - 2. Grouting and cleaning all tile work under this section.
 - 3. Cutting, fitting and drilling.
 - 4. Protection and replacement.
 - 5. Additional materials.
 - 6. Caulk joints to match grout at floor, inside corners, and at door frames.
 - 7. Sealer for gypsum board to receive tile.
 - 8. Marble saddles.

1.02 RELATED WORK

- A. Related work specified under other sections of the specifications:
 - 1. Section 07900 - Joint Sealers
 - 2. Section 10800 - Toilet Accessories

1.03 CONTRACT DOCUMENTS

- A. Applicable provisions of the "Conditions of the Contract" shall govern all work under this Section.

1.04 QUALITY ASSURANCE

- A. All ceramic tile shall be Standard Grade, of domestic manufacture, and shall conform to ANSI A137.1.
- B. Thin-set mortar shall conform to ANSI 118.1.
- C. Installation Specifications: 2020 Handbook for Installation by the Tile Council of North America.

1.05 SUBMITTALS

- A. Samples:
 - 1. The Contractor shall, before placing order for tile, submit to the Architect for approval a complete and full set of all tiles, representative of the different sizes, shapes, colors, textures, and finish to be used in the work.
 - 2. Each sample shall be labeled stating the grade.
- B. Before proceeding with the tile work, the Contractor shall furnish the Architect with a certificate of Grade (signed by both tile manufacturer and subcontractor) in form adopted by the Tile Manufacturer's Association, Inc., stating the grade, type of tile, identification marks for tile containers, and the name and location of the project.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials in unopened, original containers bearing manufacturer's labels. Store materials in a clean, dry, protected place and do not leave exposed to the weather. Take all precautions to prevent intrusion of foreign matter. Handle all materials with proper care to prevent damage of any kind.
- B. Delivered materials shall match approved samples in all respects.
- C. Tile containers shall be branded with, or have sealed within, the shipping mark and other designations corresponding with the information given on the master grade certificate.

1.07 JOB CONDITIONS

- A. Tile work shall not be installed in freezing or near freezing weather.

1.08 GUARANTEE

- A. The Contractor shall guarantee in writing to the Architect that his work will remain in place without coming loose or cracking, whatever the cause or other defects due to faults of materials or workmanship or method of setting for a period of one year after the acceptance of the building by the Owner, and that he will, within time, upon notification in writing, immediately replace any defective work or materials and restore all damage to adjoining work caused thereby at his own expense and without cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Ceramic tile, porcelain tile and base shall be as manufactured by *American-Olean Company, Daltile, Crossville* or approved equal.

- B. Ceramic tile type, size, color and pattern for walls, wainscots and base shall match existing where appropriate or as indicated on the Finish Floor Plans, Schedule and/or Interior Wall Elevations. If ceramic tile type, size, color and pattern are not specified herein, 30 percent of the total amount of all ceramic tile shall be of price group 3, 3"x6" format, from the *Classic Color Wheel* collection by *Daltile*. The remaining 70 percent of the total amount of all ceramic tile shall be of price group 2, 3"x6" format, from the *Classic Color Wheel* collection by *Daltile*.
- C. When scope requires new installation of BOTH floor and wall tile, provide 3"x6" ceramic tile flat top cove base at full perimeter unless otherwise noted. Include both left and right corners as required by layout.
- D. When scope requires installation of new wall tile ONLY (existing floor tile to remain), provide *Schluter Dilex- AHKA Sanitary Cove Base* at full perimeter. Finish to be selected by Architect.
- E. When scope calls for painted wall surface with installation of new porcelain floor tile ONLY, provide ceramic tile sanitary cove base and all corners as required by layout.
- F. At all wainscot tile applications, include 3"x6" bullnose ceramic tile (on 6" side) or *Schluter Jolly* at top course of tile. Wainscot typically +/-5'-4" A.F.F. unless otherwise noted. Include both left and right corners as required by layout.
- G. In both full and wainscot height tile applications, 3"x6" bullnose tile (on 3" side) or *Schluter Jolly* shall be used along all vertical outside corners.
- H. If porcelain floor tile type is not specified or intended to match existing, provide and install 12"x12" format tile from *Daltile's Porcelain* collection or tile of equal value. Pattern and Colors to be approved/provided by architect during submission phase.
- I. Floor tile shall be non-slip with a coefficient of friction of 0.05.
- J. All mortar mixtures for tile work shall be as recommended by the Tile Council of North America and the American National Standards Institute, Inc.
- K. Caulking and expansion joints - one part silicone rubber.
- L. Marble saddles shall be Alabama White, Class "B" or better, polished.

2.02 ADDITIONAL MATERIAL

- A. Provide one box of tile used and store them where directed by the Owner.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Before proceeding with any tiling work, make sure that all sleeves and flashing for various pipes have been installed and that pipes have been run and tested; that conduits which are to be covered are in position and have been approved; and that the locations of all other work required by other trades to be set in the walls or floors are their correct locations, height, or projections. Immediately report any errors or discrepancies to the Architect.
- B. Spaces in which tile is to be set shall be closed to traffic and other work. Spaces shall remain closed until tile is firmly set. Protect tile from damage until work is accepted by the Architect.

3.02 WORKMANSHIP

- A. Internal angles shall be butted and external angles shall be bullnosed using integral combination tile.
- B. At door trim, the tile of all base members shall be bullnosed back to the trim with integral combination tile. No block angles will be allowed.
- C. Tile shall extend into all recesses and recess openings, shall return around jambs or trimmed openings, and shall form curbs where required.
- D. All base tile required in any room shall be set before work on the floor is started. The tiles shall be brought to true lines and levels and with joints flush. Base shall stop tile at opening flush with trim.
- E. Installation of tile work shall be performed in manner conforming with the best current practice in the industry.

3.03 SETTING

- A. Thin-set bed for floor tile shall be in conformance with ANSI 108.5. Surfaces shall be clean, smooth, and level.
- B. All tile shall be set in strict accordance with the recommendations of the approved tile manufacturers, the Tile Council of North America, Inc., and the American National Standards Institute, Inc.

3.04 INSTALLATION

- A. General:
 - 1. Press individual tile onto setting bed using extreme care to maintain accurate joint alignment and spacing.
 - 2. Tile work shall be laid out in such manner to avoid excessive cutting. No cuts smaller than one-half size shall

be made. All areas of tile shall be centered and balanced. All cuts shall be made on the outer edge of the field.

3. Smooth all cut edges with a carborundum stone, and install no tile with jagged or flaked edges.
4. Fit tile closely where edges will be covered by trim, escutcheons, or other similar devices.
5. The splitting of tile is expressly prohibited.
6. Make corners of all tile flush and level with corners of adjacent tile, with due allowance to warpage tolerances.
7. Keep all joint lines straight and of even width, including miters. All joints shall be uniform, not more than $\frac{1}{4}$ ".
8. Finish floor areas level and plumb with $\frac{1}{8}$ " of true plan in 8 feet.
9. The finished tile work shall be clean and free of tiles that are pitted, chipped, cracked or scratched.

B. Recommended Installation Standards (as per Tile Council of North America):

1. Floors:

a. Concrete Subfloor:

F112-90 - Cement Mortar, Bonded
F113-90 - Dry-Set Mortar or Latex-Portland
F122-90 - Thin-Set (on waterproof membrane)

2. Walls:

a. Interior Walls (Solid Backing):

W222-90 - One Coat Method
W242-90 - Gypsum Board, Organic Adhesive

3.05 CUTTING, FITTING, AND DRILLING

- A. Do all necessary cutting, fitting, etc. of tile work wherever required in connection with this work as may be necessary to overcome any inaccuracies and to make the materials properly fit and conform to the conditions of the building, and as may be required for other mechanics in connection with their work, and to finish up after them, all in a neat and accurate manner as approved.
- B. All intersections and returns shall be neatly formed. All cutting and drilling shall be neatly done without marring the surfaces. Around outlets, piping, fittings or fixtures, etc., the tile shall be fitted close so that the usual plates, collars, or coverings shall overlap the tile.

3.06 GROUTING AND CLEANING

- A. As soon as the setting beds have sufficiently set, tile, and floors shall be thoroughly cleaned of all dirt, mortar, and foreign matter by washing and scrubbing with clean water and then all joints in quarry tile shall be grouted with gray Portland Cement and fine white sand mixed with clean water, forced into joints and finished flush and true. All traces of cement shall be wiped for the surface of tile before hardening. Grout materials shall conform to ANSI 118.1.
- B. The floor tile grout shall be spread uniformly over the floor and thoroughly worked into the joints, filling them solidly. After grouting has been completed, all surplus grout shall be removed and the floors left clean.
- C. Grout shall be colored by the addition of approved mineral coloring pigment where directed by the Architect.
- D. Grout for tile shall be mixed with an integral waterproofing compound.
- E. The use of acid solutions is prohibited. Any tile work and other work damaged by the use of a strong cleaning agent shall be replaced at the Contractor's expense.
- F. All work of other Contractors, which may have become soiled during the operation of any of the work covered under this Contract, shall be properly cleaned off without damage to such work and left in a clean, neat, and perfect condition, as approved by the Architect.

3.07 PROTECTION AND REPLACEMENT

- A. All tile work shall be adequately protected by approved means and all finished tiled areas shall be closed to all traffic or work by an approved barrier. Protection and barrier shall be removed when directed without causing any damage.
- B. Protect all work of other trades and contracts from damage caused by work under this section and make good all such damage to the satisfaction of the Architect and without cost to the Owner.
- C. Any work of other trades damaged or injured by the removing of any rejected work and the setting on new work or by a trimming, cutting, fitting, drilling, etc., or by cleaning or other cause shall be made at the Contractor's expense.
- D. Include cleaning methods, cleaning solutions recommended, stain removal methods, and polishes and waxes recommended. All methods and materials to be per tile manufacturer's recommendations.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09510 - ACOUSTIC CEILING SYSTEMS

(2X4 or 2X2 SUSPENDED TILE)

PART 1 - GENERAL

1.01 DESCRIPTION

A. Ceiling Types:

1. The extent of each type of acoustic ceiling is shown on the drawings and in schedules.
2. The types of acoustic ceilings required are as follows:
 - a. Mineral fiber acoustic panels in exposed grid suspension system.

B. Related Work:

1. Section 09900 - Painting.

C. Related Work in Other Contracts:

1. Heating, Ventilating, and Air Conditioning Work:
 - a. Grilles, diffusers, and similar air distribution components installed in acoustic ceiling system. Refer to Division 15.
2. Electric Work:
 - a. Lighting fixtures, smoke detection systems, sound systems, and similar electrical components installed in acoustic ceiling system. Refer to Division 16.

1.02 QUALITY ASSURANCE:

A. Installer Requirements:

1. Acceptable to manufacturer of primary acoustic materials.

1.03 SUBMISSIONS:

- A. Submissions shall be in accordance with Section 01300 - Submissions, and as modified below.

B. Product Data:

1. Submit manufacturer's specifications and installation instructions for each acoustic ceiling system required.

C. Samples:

1. Architect's review will be for color and texture only.

Compliance with all other requirements is the exclusive responsibility of the contractor.

2. Submit samples of the following:

- a. Exposed grids: Submit three 12" long samples of each type exposed runner.
- b. Moldings: Submit three 12" long samples of each type required.
- c. Acoustic units: Submit 3 sets of 12" square samples for each different acoustic unit required. Each set of samples shall show the full range of color and texture to be expected in the completed work.

D. Maintenance Instructions:

1. Submit two copies of the manufacturer's recommendations for cleaning and refinishing each type of acoustic unit used in the work. Include precautions against materials and methods which may be detrimental to finishes and acoustic efficiency. Submit to Architect for transmittal to Owner.

E. Replacement Materials:

1. When work is completed, deliver stock of replacement material to Owner for each type of acoustic unit used in the work. Furnish full size units, matching installed materials, package and mark for identification. Obtain receipt; submit copy of receipt for Architect.
2. Furnish not less than 1% of the total amount of each type of acoustic panel unit installed.

1.04 DELIVERY AND STORAGE:

- A. Deliver acoustic ceiling materials to the job site in original, unopened packages, bearing manufacturer's name and label identifying each type of acoustic unit.
- B. Storage Areas:
 1. Comply with acoustic material manufacturer's recommendations for storage of units to be used in the work.

1.05 PROJECT/SITE CONDITIONS:

- A. Environmental Requirements:
 1. Do not install ceiling panels until building is closed in and HVAC system is operational.
 2. Locate materials onsite at least 24 hours before beginning

installation to allow materials to reach temperature and moisture equilibrium.

3. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during and after installation:
 - a. Relative Humidity: 65-75%
 - b. Uniform Temperature: 55-70°F (13-21°C).

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEMS:

A. Quality Standard:

1. Provide direct hung suspension system complying with ASTM C 635 for the following structural classifications:
 - a. Intermediate duty, unless otherwise indicated.

B. Manufacturers:

1. Provide suspension systems for acoustic ceilings as produced by one of the following:
 - a. Chicago Metallic Corp., Chicago, Illinois.
 - b. Donn Corp., Westlake, Ohio.

C. Hangers:

1. Provide hangers as recommended by suspension system manufacturer to comply with specified structural classification.
 - a. If suspension system manufacturer does not indicate hanger recommendation, provide not less than 9 gauge galvanized, soft annealed, mild steel wire.
2. Where hanger wires cannot be directly wire-tied to structural or intermediate framing members, provide attachment devices designed for the type of construction used in the work and with a carrying capacity of not less than 5 times the design loads involved.

D. Edge Moldings:

1. Provide manufacturer's standard angle or channel molding for edges and penetrations of ceiling, with single flange of molding exposed, white baked enamel finish.

E. Exposed Grid Suspension System:

1. Provide Class A fire rated single web steel main runners,

matching interlocking cross runners, adapters, and accessories with exposed cross runners coped to lay flush with main runners.

2. Finish: Smooth, matte white baked enamel.

F. Protective Coatings and Finish:

1. Provide manufacturer's standard coatings and finishes for normal use environments (ASTM C 635), except as noted.
2. In toilet rooms, provide protective coatings and finishes complying with High Humidity Test Requirements (ASTM C 635).

2.02 ACOUSTIC CEILING UNITS:

A. Manufacturers:

1. For convenience, details and specifications have been based on products indicated by the following manufacturers:
 - a. Mineral fiber acoustic panels and tiles: Armstrong World Industries, Lancaster, Pennsylvania.
2. Other manufacturers offering mineral fiber acoustic panels and tiles complying with the requirements include:
 - a. Celotex Corp., Tampa, Florida.
 - b. United States Gypsum Co., Chicago, Illinois.

B. Mineral Fiber Acoustic Panels:

1. Provide units, not less than 5/8" thick, with flame spread of 25 or less (ASTM E84) complying with performance requirements and physical characteristics of the specified panels indicated in the construction documents.

2.03 ACCESSORIES:

A. Hold Down Clips:

1. Provide manufacturer's standard spring steel clips spaced as recommended by said manufacturer in the following spaces:
 - a. All gymnasiums.
 - b. All recreation rooms.
 - c. All High School corridors.
 - d. All Middle School corridors.

PART 3 - EXECUTION

3.01 INSTALLATION OF SUSPENSION SYSTEMS:

A. General:

1. Coordination: Prior to start of acoustic ceiling work, consult other trades and contractors involved to determine areas of potential interference. Do not start installation of suspension systems until interferences have been resolved.
2. Provide framed openings around all sides of openings receiving items set in or attached to ceilings.
3. Install suspension systems in accordance with manufacturer's printed instructions and to comply with the requirements of ASTM C 636.

B. Hangers:

1. Space not more than 6" from each end and not more than 4' o.c. between ends of members to be supported. Provide additional hangers for support of light fixtures and other items to be supported by the ceiling suspension system including clips to securely fasten all framing members (used to support fixtures) to each other to prevent eccentric deflection or rotation of supporting runners.

C. Moldings:

1. Provide edge moldings where ceilings meet walls, partitions, and other vertical elements.
2. Corners: Miter cut inside and outside corners.

D. Runners:

1. Support main runners directly from hangers; do not bear on walls or partitions. Space main runners to support acoustic panels and other work resting in or on the ceiling, as

required to comply with specified performance requirements. Interlock cross-runners with either main runners or with cross-runners structurally classified as main runners. Install moldings with exposed leg in same plane as bottom flange of runners.

- E. Where ceiling suspension systems are attached directly to the bottom chord of joists, ceiling extensions (either an extended bottom chord element or a separate unit, to suit manufacturer's standards, or sufficient strength to support ceiling construction) shall be provided. Extend ends to within 1/2" of finished wall surface unless otherwise indicated.

3.02 INSTALLATION OF ACOUSTIC CEILING UNITS:

A. General:

1. Do not install acoustic ceilings until installation areas meet the following requirements:
 - a. Exterior openings have been closed and roofs are

weathertight.

- b. Mechanical, electrical, and other work above ceilings has been completed.
- c. Wet work has been installed.
- d. Temperature and relative humidity have reached levels which comply with acoustic material manufacturer's recommendations for the units to be used in the work and are acceptable to the installer.

- 2. Install materials in accordance with manufacturer's printed instructions and other recommendations applicable to the work.
- 3. Balance border areas to avoid units of less than 1/2 unit width wherever possible. Wherever ceiling area is a multiple of full size acoustic units used in the work, balance alignment to be square and true and install only full size units for entire ceiling including borders.

B. Installation of Acoustic Panels in Exposed Grid Suspension Systems:

- 1. Install square edge panels to rest on flanges of grid tees with border units supported by moldings.
 - a. Field cut border units square and support on wall moldings.
- 2. Provide hold-down clips for panel areas where indicated; omit clips where access areas are shown.
 - a. Install 2 clips per panel at center of opposite sides of long dimension.
 - b. Install 4 clips per panel at midpoint of each side.

3.03 CLEAN UP AND PROTECTION:

- A. Clean exposed surfaces of acoustic units and suspension systems; comply with manufacturer's instructions. Remove and replace units and members which are damaged or cannot be cleaned.

END OF SECTION

DIVISION 9 - FINISHES

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.02 DESCRIPTION

- A. Work included: Paint and finish all new and existing interior and exterior wall surfaces related with proposed work area and all new and existing steel structures specified on drawings.
 - 1. Examine the specifications and drawings of all trades and thoroughly be familiar with all provisions regarding painted work included therein. Surfaces shown, noted, scheduled, or specified to receive painters' finish as part of the work of this section.
 - 2. The painting subcontractor shall furnish, maintain, and remove when no longer required, all scaffolding, staging, and riggings required for this work.

1.03 RELATED WORK DESCRIBED ELSEWHERE

- A. Shop Coats: Refer to specific project manual sections for shop coats on items such as structural steel, miscellaneous metal, custom hollow metal work, and similar items.
- B. Pre-Finished Items: Refer to specific project manual sections for factory-finished, or installer finishes.

1.04 WORK NOT INCLUDED

- A. Do not include painting, which is specified under other sections.
- B. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces, and duct shafts.
- C. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this section except as may be specified herein.
- D. Do not paint any moving parts of operating units, mechanical or electrical parts such as valve operators, linkages, sinkages, sensing devices, and motor shafts, unless otherwise indicated.
- E. Do not paint over any required labels or equipment identification, performance rating, name or nomenclature plates.

1.05 DEFINITIONS

- A. The term "paint," as used herein, means all coating systems materials including primers, emulsions, epoxy, enamels, stains, sealers, fillers, and other applied materials where used as prime, intermediate, or finish coats.

1.06 QUALITY ASSURANCE

- A. Standards: Comply with standards specified in the section and as listed in Section 01085.
- B. Qualifications of Manufacturers: Products used in the work of this section shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production acceptable to the Architect.
- C. Qualifications of Applicators:
 - 1. Provide at least one person who shall be present at all times during execution of the work of this section, who shall be thoroughly familiar with the specified requirements and the materials and methods needed for their execution, and who shall direct all work performed under this section.
 - 2. Provide adequate numbers of workman skilled in the necessary crafts and properly informed of the methods and materials to be used.
 - 3. Minimum three years of experience in applying commercial coating systems similar to the materials specified.
- D. Paint Coordination:
 - 1. Provide finish coats, which are compatible with the prime coats used.
 - 2. Review other sections of this specification as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
 - 3. Upon request, furnish information on the characteristics of the specific finish materials to ensure that compatible prime coats are used.
 - 4. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required.
 - 5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coating supplied under other sections.

E. Field Samples:

1. Before proceeding with paint application, finish one complete surface of each color scheme required, clearly indicating selected colors, finish texture, materials, and workmanship.
2. Sample areas, when accepted by the Architect, shall serve as a minimum standard for work throughout the entire project.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title.
2. Product description (generic classification or binder type).
3. Federal Specification Number, if applicable.
4. Manufacturer's stock number and date of manufacture.
5. Contents by volume, for pigment and vehicle constituents.
6. Thinning instructions.
7. Application and instructions.
8. Color name and number.

B. Storage:

1. Provide proper storage to prevent damage to, and deterioration of, paint materials.
2. Store all materials in a single location approved by the Architect. Storage area is to be kept neat and clean. Any damage to the storage area or surrounding occurring during its use for storage shall be repaired to its original state (Architect's acceptance required). Remove all soiled or used rags, waste, and trash from the building every night and take every precaution to avoid damage of fire.

C. Protection:

1. Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of other trades.

D. Replacement:

1. In the event of damage, immediately make all the repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1.08 JOB CONDITIONS

- A. Provide continuous heating and ventilation as required to maintain surface and ambient temperatures above 50°F for at least 24 hours before, during and for at least 48 hours after paint application.
- B. Do not apply paint in snow, rain, fog, or mist, or when relative humidity exceeds paint manufacturer's recommended limits. Avoid painting surfaces while they are exposed to hot sun.
- C. Lighting: Provide minimum 80 foot candle light level at mid-height of substrate surface.

1.09 EXTRA STOCK

- A. Amount: Upon completion of the work of this section, deliver to the Owner an extra stock equaling 10% of each color, type, and gloss of paint used on the work.
- B. Packaging: Tightly seal each container and clearly label with the contents and location used.

1.10 SUBMISSIONS

- A. General: Comply with requirements of Section 01300 and as modified bellow.
- B. Product Data:
 1. Submit to the Architect a complete schedule of paint materials proposed to be furnished and installed under this section, including name of manufacturer and type of paint.
 2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
 3. For information only, submit two copies of manufacturer's specifications, including paint analysis and application instructions for each material. Indicate by transmittal that a copy of each manufacturer's instructions has been distributed to the applicator.
- C. Samples: Submit three (3) 8 ½" x 11" paint strike offs of each paint color and paint type specified for color match verification. Identify each sample as to finish, formula, color name, and color number.
- D. Stain Samples: Submit three (3) 8 ½" x 10" wood samples of stain matching specified wood species and color for architect's approval.

- E. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

- A. Design is based on the use of paint products manufactured by Benjamin Moore and the materials of that manufacturer are named in the painting schedule. Equal products of other manufacturers approved in advance by the Architect may be utilized.
- B. General: Provide the best quality grade of the various types of coatings as regularly manufactured by paint materials manufacturers approved by the Architect. Materials not displaying the manufacturer's identification as a standard best-grade product will not be acceptable.
- C. Durability: Provide paints of durable and washable quality. Do not use paint materials, which will not withstand normal washing, as required to remove pencil marks, ink, ordinary soil, and similar material without showing discoloration, loss of gloss, staining or other damage.
- D. Colors and Glosses: Provide colors and glosses to match existing from manufacturer's full range of colors for each product indicated.
- E. Undercoats and Thinners: Provide undercoat paint produced by the same manufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer, and use only the recommended limits. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.
- F. Standards: Provide paint materials which meet or exceed the standards listed for each application in the Painting Schedule in Part 3 of this section.
 - 1. All paint to be V.O.C. compliant.
- G. Application Equipment: For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint and as approved by the Architect.
- H. Other Materials: All other materials, not specifically described but required for a complete and proper installation of the work of this section, shall be new, first-quality of their respective kinds, and as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Prior to installation of the work of this section, carefully inspect the installed work of all other trades and verify that such work is complete to the point where this installation may properly commence. Verify that painting may be completed in strict accordance with the original design and with the manufacturer's recommendations as approved by the Architect.

3.02 DISCREPANCIES

- A. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.
 - 1. Start of painting will be construed as the applicator's acceptance of surfaces and conditions within a particular area.

3.03 MATERIALS PREPARATION

- A. General
 - 1. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's requirements and application instructions as approved by the Architect.
 - 2. Remove all removable items, which are in place and are not scheduled to receive paint finish, or provide surface-applied protection prior to surface preparation and painting operations.
 - 3. Following completion of painting in each space or area, reinstall the removed items by using workmen skilled in the necessary trades.
 - 4. Clean each surface to be painted prior to applying paint or surface treatment.
 - 5. Remove oil and grease with clean cloths and cleaning solvents of low toxicity and a flash point in excess of 38°C (100°F), prior to start of mechanical cleaning.
 - 6. Schedule the cleaning and painting in coordination with the Owner.
- B. Preparation of Metal Surfaces: Clean non-galvanized, ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.
 - 1. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.

2. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush; clean with solvents recommended by the paint manufacturer, and touch-up with same primer as the shop coat.
3. On galvanized steel, aluminum and other non-ferrous metals: clean bare metals with oil and grease emulsifier in accordance with manufacturer's instructions. BM Corotech V600 or XIM GON-20 Prep Cleaner or equal.
4. Allow to dry thoroughly before application of paint.

3.04 STAIN APPLICATION

- A. Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view and dust off. Scrape and clean small, dry seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of priming coat. After priming fill holes and imperfections in finished surfaces with putty or plastic wood filler. Sandpaper smooth when dried.
- B. Stain or seal wood required to be painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases and paneling.
- C. When transparent finish is required, use spar varnish for back priming.
- D. Back-prime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.
- E. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

3.05 PAINT APPLICATIONS

- A. General
 1. Apply products in accordance with manufacturer's instructions.
 2. Secure color schedules before applying paint or finish. Tint primer and undercoat to the approximate shade of the finish coat.
 3. Apply all materials under adequate illumination and as follows:
 - a. Brush Application: Brush out and work all brush coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.

b. Spray Application:

1. Confine spray application to metal framework and similar surfaces where hand brushwork would be inferior.
2. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building of film thickness of two coats in one pass.
4. Allow sufficient drying time between coats. Modify the period as recommended by the material manufacturer to suit adverse weather conditions.
5. Apply materials in sufficient quantity to insure complete coverage and hide. Provide and apply additional coats until paint film is uniform in finish, color, appearance, and coverage.

B. Cleaning:

1. Promptly remove spilled, splashed, or splattered paint on finish as work proceeds and upon completion.
2. Keep premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris during progress of work.
3. Upon completion of work, leave premises in neat and clean condition.

- C. Completed work shall match the approved samples for color, texture, and coverage. Remove, refinish, or repaint all work not in compliance with specified requirements.

3.06 PAINTING SCHEDULE

- A. General: Painting required under this section is called for on the drawings. Paint types for specific surfaces, exterior and interior are as defined below:

<u>Exterior Work</u>			
<u>Surface</u>	<u>1st Coat</u>	<u>2nd Coat</u>	<u>3rd Coat</u>
Hollow Metal Doors & Frames (Note 3 & 4)	B or *	A	A
Exposed Miscellaneous Metal or Structural Steel (Note 3 & 4)	T or *	I	I
Steel Handrails & Steel Lintels (Note 3 & 4)	T	I	I
Traffic Bearing Exterior Metals (Steel Ladders - Foot Traffic) (Note 3 & 4)	N	R	R
Aluminum (Note 4)	B	A	A
Wood, Visible Blocking, Plywood	C	D	D
Visible Metal Plaster accessories adjoining stucco	T	I	I
Concrete Block	E	F	F
Galvanized Metal (Note 4)	B	I	I
Concrete Walls	O	F	F

Interior Work			
Surface	1st Coat	2nd Coat	3rd Coat
Concrete Block	E	G	G
Plaster	M	G	G
Gypsum Drywall	M	G	G
Concrete Walls	O	G	G
Concrete Floors (Note 1 & 5)	N	Q	Q
Concrete Floors (High Vehicle Traffic, Wet Environments) (Note 1)	N	U	R
Wood-Painted (Note 2)	H	G	G
Wood-Natural Finish	J	J	J
Wood-Stained Finish	S	J	J
Hollow Metal, Steel Handrails & Steel Stair Components (Note 3 & 4)	B or *	A	A
Exposed Structural Steel & Steel Joists (Note 3 & 4)	B or *	K or L	K or L
Galvanized Steel Floor or Roof Deck (Note 4)	B	K or L	K or L
Miscellaneous Metal (Note 3 & 4)	B or *	L	L
Steel Floor Deck (Diamond Plate etc.) (Note 3 & 4)	N	R	R
Galvanized Metal (Note 3 & 4)	B	A	A
Exposed Ductwork (Note 4)	B	K or L	K or L

*Shop Coat - See other sections of Project Manual

Note 1: Where non-skid properties are required, a non-skid additive shall be used. Apply per manufacturer's instructions. Confirm if required via Architect.

Note 2: This is for large exposed surfaces. Where paint is indicated on narrow recesses, or on visible surface of back-up supports or blocking, use flat enamel.

Note 3: Inspect shop coat and touch up prior to finish coat application to prevent finish coat contacting bare steel. All exposed structural steel is to be painted in finished areas as per schedule unless noted otherwise on the Contract Documents.

Note 4: Prior to priming and painting of exposed ductwork, galvanized steel, aluminum and other non-ferrous metals the Contractor shall clean bare metal with an oil and grease emulsifier (Moore's Corotech V600 or XIM GON-20 Prep Cleaner or equal). This product shall be ready to apply from the container. Careful surface preparation and cleaning is required. All surfaces shall be thoroughly clean and free from all grease, wax, oil, polish, loose paint, dirt or rust. Do not use mineral spirits, turpentine solvent or cleaners which will leave an oily residue. Apply clean and remove/rinse in accordance with manufacturer's instructions.

Note 5: For concrete floors V155 (TYPEN) is 1st coat for V410. If Type N122 is chosen 1st coat is a thin coat of N122

3.07 KEY TO PAINTS

* Shop coat: See other section of Project Manual.

A	Moore's Corotech Acrylic DTM Enamel Semi-Gloss V331
B	Moore's Corotech Acrylic Metal Primer V110
C	Moore's Fresh Start Exterior Oil Primer 094
D	Moore's Ultra Spec EXT Low Lustre Finish N455
E	Moore's Ultra Spec Masonry Int/Ext Hi-Build Block Filler 571 or Moore's Blockfiller 244.
F	Moore's Ultra Spec EXT Gloss N449
G	Moore's Ultra Spec 500 Interior Latex Gloss N540 (traditional semi-gloss) or BM Ultra Spec 500 Interior Latex Eggshell N538 (Item "G" gloss shall be determined by this Architect)
H	Moore's Fresh Start Multi-Purpose Oil-Based Primer 024
I	Moore's Super Spec HP Urethane Alkyd Gloss Enamel P22
J	Moore's Benwood Stays Clear Acrylic Polyurethane Low Lustre N423
K	Moore's Latex Dry Fall Flat 395
L	Moore's Ultra Spec 500 Interior Acrylic Flat N536
M	Moore's Fresh Start Multi-Purpose Latex Primer 023
N	Moore's Corotech 100% Solid Epoxy Pre-Primer V155
O	Moore's Ultra Spec Masonry Int/Ext 100% Acrylic Masonry Sealer 608
P	NOT USED
Q	Moore's Latex Floor & Patio Enamel Low Sheen N122, <u>or</u> BM Corotech Fast Dry Polyamide Epoxy V410 (Item "Q" shall be as determined by this Architect).
R	Moore' Corotech Aliphatic Acrylic Urethane Semi-Gloss V510
S	Moore's Lenmar Waterborne Interior Wiping Stain 1WB.1300
T	Moore's Super Spec HP Alkyd Metal Primer P06
U	Moore's Corotech 100% Solids Epoxy Floor Coating V430

END OF SECTION

DIVISION 10 - SPECIALTIES

SECTION 10441 - SIGNAGE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish and install non-illuminated signs at selected locations as specified herein.

1.02 SHOP DRAWINGS

- A. Before any work is fabricated or delivered to the job site, shop drawings and/or catalog cuts of accessories shall be submitted for approval in accordance with the applicable provisions of the "General Conditions". Furnish itemized accessory lists, indicating location, height, quantity, and accessories being provided.

1.03 SAMPLES

- A. Submit samples, if requested, for approval in accordance with applicable provisions of the "General Conditions".

1.04 GENERAL REQUIREMENTS

- A. Visit the site and check field conditions, locations, and dimensions affecting this work. Report any conditions which will interfere with, or prevent, proper execution of the work.

PART 2 - PRODUCTS

2.01 SIGNAGE

- A. Furnish and install, at all exterior ramps, walkways, and parking locations modified to accommodate the handicapped, die embossed 12" x 18" heavy duty steel signs, protected with three (3) coats of baked enamel. Sign shall be provided with the international words "HANDICAPPED PARKING" printed in white at the bottom. Signs shall be securely mounted on heavy rail steel (weight 2 lbs./ft.) U-channel posts, driven into the ground a minimum of four (4) feet or embedded into minimum 1'-0" diameter x 2'-0" deep concrete footings.
- B. Furnish and install, at all handicap accessible entries, toilet rooms, and ramp locations, handicapped signs with 1/8" thick raised white international symbol of access and raised letters and/or numerals 1/32" high (minimum), upper case Sans Serif or Simple Serif type, accompanied with Grade 2 Braille characters at least 5/8" high, but no higher than 2". Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram.
- C. The vertical space allowed for a pictogram shall be a minimum of 6"

in height, (i.e., picture a 6" high window with a pictogram superimposed into it; the pictogram itself does not have to be a full 6"). Within this 6" window, you cannot place Grade 2 Braille or text.

- D. Raised borders around pictograms are not required and can sometimes cause confusion for the tactile reader. If used, it is suggested that they be placed a reasonable distance from the other text elements.
- E. Pictograms do not need to be raised. This gives the sign maker the option to use surface engraving, reverse engraving, raised, or other methods for the pictogram portion of the sign.
- F. Furnish and install "Emergency Evacuation Route" signage, (12"h x 18"w), location, style and quantity shall be as directed by Architect. Refer to Item B above for lettering and Braille requirements.
- G. Furnish and install all building "Maximum Occupancy" signage, (18"h x 24"w) in all areas affected by the scope of work where not already provided. Location, style and quantity shall be as directed by Architect. All signage shall be in conformance with local Fire Marshal's Office requirements.

2.02 CHARACTER PROPORTION

- A. Letters and numbers in signs shall have a width-to-height ratio between 3:5 and 1:1.
- B. Stroke width-to-height ratio shall be between 1:5 and 1:10.

2.03 SIGN FINISH AND CONTRAST

- A. Characters and background of signs shall be eggshell, matte, or other non-glare finish.
- B. Characters and symbols contrast with their background - either light characters on a dark background or dark characters on a light background. Examples of acceptable color combinations would be white/black, white/red, and white blue. Unacceptable would be light green/dark green, dark green, and dark gray/black.
- C. The preference is through the use of light characters or symbols on a dark background.
- D. All interior plastic signage shall have a surface burning characteristic, Class A and flame spread rating not to exceed 0-25 and smoke developed rating not to exceed 450, in accordance with ASTM E-84.

PART 3 - EXECUTION

3.01 MOUNTING LOCATION AND HEIGHT

- A. Where permanent identification is provided for rooms and spaces, signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door (including double leaf doors), signs shall be placed on the nearest adjacent wall.
- B. Mounting height shall be 60" above the finish floor to the centerline of the sign.
- C. Mounting location for such signage shall be so that a person may approach within 3" of signage without encountering protruding objects or standing within the swing of a door.
- D. Location and colors of signs shall be as selected by the Owner and approved by the Architect.
- E. Signs shall be securely mounted to the wall surface as recommended by the manufacturer and as approved by the Architect.
- F. Signs shall be as manufactured by Allstate Sign and Plaque, 70 Burt Drive, Deer Park, New York, or approved equal. (Signage shall comply with M.U.T.C.D.)
- G. All signage shall be installed in accordance with CABO/ANSI 117.1 and ADA standards and requirements.

3.02 GUARANTEE

- A. All materials and workmanship shall be guaranteed for a period of not less than one (1) year from date of final completion in accordance with the applicable provisions of the "General Conditions".

END OF SECTION

DIVISION 10 - SPECIALTIES

SECTION 10800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

- A. The Contractor shall provide and install all toilet room and water closet accessories as specified herein.
- B. Related work in other sections of the specifications includes, but are not limited to, the following:
 - 1. Section 10600 - Toilet Room Partitions.

1.02 SUBMITTALS:

- A. Shop Drawings.
 - 1. Submit shop drawings of all accessories. Shop drawing shall show location, mounting height, and attachment and anchorage details.
- B. Manufacturer's Data:
 - 1. Submit manufacturer's product data for all accessories to include recommended installation requirements.
- C. Submission:
 - 1. All submittals shall be forwarded in a timely manner in accordance with the requirements of Section 01300 of the Project Manual.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver all materials to project in manufacturer's unopened, original packaging bearing clear identification of brand and name.

1.04 JOB CONDITIONS:

- A. General Contractor shall be responsible for receiving, storing, and protection of toilet accessories against loss, misplacement, theft, or damage.
- B. General Contractor shall be responsible for the proper installation of the toilet accessories in strict accordance with the approved submittals and instruction sheets.
- C. Inserts and anchoring devices which must be set in concrete or masonry shall be delivered in time so as not to delay the construction schedule.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. All products shall be as manufactured by Bradley (unless otherwise noted), or equal, as follows.

1. Mirrors: Standard Model 780-1836-2 Framed Mirror. Provide barrier free Model 740-1836-2 where indicated on the drawings. For all mirror types, provide quantity as indicated on the drawings for 18" wide x 36" high mirror with theft resistant mounting. Mirror shall be framed with Type 304 (18-8), 3/4" x 3/4" 18 gauge stainless steel angle with 20 gauge-concealed stiffeners. Welded corners shall be polished to a uniform satin finish. Mirror shall be of first quality 1/4" tempered glass guaranteed for 15 years against silver spoilage and protected by shock absorbing, waterproof filler. Back of unit shall be 20 gauge galvanized steel secure to frame with concealed screws, equipped with integral horizontal hanging brackets and separate wall hanger for concealed mounting.
2. Soap Dispensers: Model 6542 horizontal, tank type, surface mounted soap dispenser. One (1) for each lavatory. Surface mounted liquid soap dispenser shall be fabricated of Type 304 20 gauge satin finish stainless steel. Dispenser shall have completely concealed mounting, vandal-resistant filler hole cover and sight gauge. Push-in corrosion-resistant liquid soap valve. Capacity: 40 oz. liquid soap. Overall dimensions: 8-1/8" W x 4-3/4" H x 3" D.
3. Grab Bars: Model 8320-2 grab bars with safety grip finish. Provide grab bars as specified herein and indicated on the drawings. Flanges shall be fabricated of Type 304 (18-8), 3-1/8" diameter 11-gauge stainless steel. Escutcheons shall be of Type 304 (18-8), 22-gauge stainless steel. One piece drawn construction with exposed surfaces in architectural satin finish. Provide snap over flanges to conceal mounting screws. Tubing shall be of Type 304 (18-8), 1-1/4" O.D. 18 gauge stainless steel, and seamless construction with exposed surfaces in architectural satin finish. Bent ends of tubing pass through the flanges and are heliarc welded into a single structural unit for maximum strength. Intermediate supports are contour cut and joined by heliarc welding to form an integral part of the grab bar. All welds ground and polished to blend. Use mandrel-bending process to maintain uniform bar diameter. Return shall provide 1-1/2" standard safety clearance between wall and bar. Heavy-duty grab bars shall withstand loads in excess of 1,300 lbs. without failure when mounted as per manufacturer's recommendation. Provide certification of the grab bar test data as performed by an independent professional testing laboratory.
4. Paper Towel Dispenser: Model 250-15. Provide one (1) per toilet room or additional dispensers as indicated on the drawings. Surface mounted towel dispenser shall be fabricated of Type 304 (18-8), 22 gauge stainless steel with exposed surfaces in satin finish. Refill indicator on face of cabinet. Tumbler lock to secure hinged front panel. Towel dispenser capacity 500 multi-fold or 300 C-fold towels. Overall dimensions: 11" W x 15-5/16" H x 4" D.

5. Toilet Paper Dispenser: Model 5402, one (1) per toilet stall. Surface mounted dual roll toilet tissue dispenser shall be Type 304 (18-8), 22 gauge satin finish stainless steel and hold two standard core toilet tissue rolls. Dispenser shall have full-length piano hinge and keyed tumbler lock. Overall dimensions: 5-9/16" W x 10-3/8" H x 5-3/16" D.
6. Automatic Hand Dryers: Excel Dryer, Inc., Xlerator, Model XL-W (electronic controls). Provide at locations and in quantities as indicated on the Drawings. If not shown in the drawings, only paper towel dispensers are required. Surface mounted, cover shall be one piece heavy-duty, die cast zinc alloy, 5/8" HP motor with air velocity of 16,000 LFM at the air outlet (900 W heating element). Power requirements: 120V, 12.5 amp, 60 Hz.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Installations shall be rigid, straight, plumb, and level with proper clearances.
- B. Installation shall be as per manufacturer's instructions.

3.02 ADJUST AND CLEAN:

- A. Adjust and lubricate all hardware for proper operation after installation.
- B. Clean and touch up exposed surfaces following manufacturer's recommendations.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15010 - GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. This Section contains General Provisions related specifically to the Mechanical Work.
 - 1. Quality Assurance.
 - 2. Terminology.
 - 3. Protection.
 - 4. Coordination and Sequencing.
 - 5. General Completion.
 - 6. Demolition.
 - 7. Cutting and Patching.
 - 8. Excavation for Mechanical Work.
 - 9. Concrete for Mechanical Work.
- B. Drawings and General Provisions of Contract, including General and Supplementary Conditions, apply to this section.

1.02 QUALITY ASSURANCE

- A. Laws, Permits, Inspections.
 - 1. Comply with latest revisions of New York State Uniform Fire Protection and Construction Code, NYSED Manual of Planning Standards, any Local Codes or Regulations that apply.
 - 2. Underwriters Laboratories label required for all electrical materials carrying 50 volts or more.
 - 3. Comply with New York State Energy Conservation Construction Code.
 - 4. Comply to requirements of drawings and specifications that are in excess of governing codes.
 - 5. Comply with section 1621 of the New York State Building Code for seismic requirements.
 - 6. Do not install work as specified or shown if in conflict with governing code. Notify Engineer and request direction.
 - 7. Pay all Inspection and Permit fees.
 - 8. Provide Certificate of Inspection from all governing authorities.
- B. Reference to technical society, organization, body or section made in accordance with the following abbreviations:
 - 1. AIA American Institute of Architects
 - 2. AMCA Air Moving and Conditioning Association, Inc.
 - 3. ANSI American National Standards Institute.
 - 4. ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
 - 5. ASME American Society of Mechanical Engineers
 - 6. ASTM American Society of Testing Materials
 - 7. AWS American Welding Society Code
 - 8. AWWA American Water Works Association
 - 9. IEEE Institute of Electric and Electronics Engineers

10. NEC National Electric Code
 11. NEMA National Electrical Manufacturer's Association
 12. NFPA National Fire Protection Association
 13. NYBFU New York Board of Fire Underwriters
 14. NYCRR - Codes, Rules and Regulations of the State of New York.
 15. NSF - National Sanitation Foundation
 16. PDI - Plumbing and Drainage Institute.
 17. SMACNA Sheet Metal and Air Conditioning Contractors National Association
 18. UL Underwriters' Laboratories, Inc.
- C. Contractor submission of equivalent or substitute items other than those specified is at Contractor convenience only. If a substitution or equivalent is accepted, the Contractor shall coordinate the installation of the substitute or equivalent and make all associated changes required. The Contractor also waives any claim for additional costs associated with the substitute / equivalent which becomes apparent before, during or after installation. The Contractor agrees to bear any and all additional costs to all other contractors or subcontractors which are caused by the incorporation of the substitution / equivalent.
- D. The Contractor shall, as part of his contract, furnish and install all equipment, materials, wiring accessories, and on-site installation of equipment as required by current standards of good practice.
- E. All materials and equipment to be furnished and installed shall be new and of first quality and be free from all defects.

1.03 TERMINOLOGY

- A. The following terminology and definitions are used on this project as related to the Mechanical Work.
1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces and tunnels.
 2. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
 3. Exposed Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
 4. Concealed Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
 5. Concealed Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

6. Sewers: Refer to underground connections from building to street mains. Sewers begin at points 5 feet outside building wall.
7. Service Connections: Refer to underground connections from 5 feet outside building wall to street mains.
8. Underground Lines: Refer to piping buried in earth inside and within 5 feet outside building.
9. Building Lines: Refer to all other lines.
10. For other definitions refer to latest issue of New York State Plumbing Code, and all revisions.

1.04 PROTECTION

- A. Protect equipment from damage, including water, chemical, mechanical injury and theft.
- B. Replace damaged equipment or components.
- C. Close and waterproof between sleeves, openings, pipes and voids in walls, floors and foundations to prevent entrance of water or moisture.
- D. Holes made in fire walls, partitions, fire stops, shall be patched to maintain fire rating integrity.
- E. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris and moisture.
- F. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.
- G. Protect flanges, fittings, and piping specialties from moisture and dirt.
- H. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.
- I. If permanently installed air handler equipment/systems are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used in each unit and at each return air grille/opening, as determined by ASHRAE 52.2 Replace all unit filtration media with a Minimum Efficiency Reporting Value (MERV) of 13 immediately prior to occupancy and verify ductwork cleanliness; if ductwork is found contaminated, clean ductwork and associated air handling equipment and replace filtration media.

1.05 COORDINATION AND SEQUENCING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for chases, slots and openings in building structure during progress of construction, to allow for mechanical installations.

- C. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.
- E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors where mechanical items requiring access are concealed behind finished surfaces. Access panels and doors shall be submitted and approved by the engineer.
- G. Coordinate installation of identifying devices after completion of covering and painting, where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.
- H. Coordination with other trades: Right-of-Way as follows:
 - 1. Light Fixtures.
 - 2. Drain Pipes and Vents.
 - 3. Ductwork.
 - 4. HVAC Piping.
 - 5. Domestic Water Piping.
 - 6. Electrical Conduit.
- I. Work in existing building.
 - 1. Verify existing locations of pipe, ductwork equipment and conduit in field.
 - 2. Extend existing systems as required for proper tie-in to new systems.
 - 3. Leave existing equipment to be reused in satisfactory working order.
 - 4. Remove from building all existing piping, ductwork, equipment and similar items which do not conform to new layout. Before disposing of these items, determine if Owner wishes to retain them.
- J. Changeovers and continuity of services.
 - 1. Make changeovers, tie-ins, removal, and perform similar work that affect operation of present building at times approved by Owner.
 - 2. Make temporary connections required to keep present building systems and equipment in operation.
 - 3. Prior to any shutdown of present building, have necessary materials at site.

1.06 GENERAL COMPLETION

- A. Oiling Equipment.
 - 1. Lubricate equipment and motors in accordance with manufacturer's requirements.
- B. Instructions to Owner's Representative.
 - 1. Give notice to Engineer when all systems are installed and operating.
 - 2. Obtain name of Owner's Representative to receive instructions.
 - 3. Schedule instructions of Owner's Representative by manufacturer's representative and instruct Owner in system installation and operation for:
 - a. Heating, Ventilating & Air Conditioning Equipment.
 - b. Fan equipment.
 - c. Pumps.
 - d. Temperature control.
 - e. Equipment lubrication.
 - f. Packaged systems.
- C. Provide Operation and Maintenance manuals in accordance with the requirements of Division 1 "Project Closeout" Section. Provide an instructional video to the owner of the training / maintenance instruction sessions with the owner.

1.07 PAINTING AND FINISHING

- A. Refer to "Painting" Section 09900 for field painting requirements.
- B. Damage and Touch-up: Repair marred and damaged factory painted finishes with materials and procedures to match original factory finish.

1.08 DEMOLITION

- A. Disconnect, demolish, and remove work specified under Division 15 and as indicated.
- B. Where pipe, ductwork, insulation or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
- C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.
- D. Abandoned Work: Cut and remove buried pipe abandoned in place, 2 inches beyond the face of adjacent construction. Cap and patch surface to match existing finish.
- E. Removal: Remove indicated equipment from the project site.

- F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation. Add cap off and pressure test prior to putting back in service.

1.09 CUTTING AND PATCHING

- A. All cutting required to facilitate the proper installation of all work to be installed under Div. 15, shall be done by Div. 15 contractor.
- B. Cut, channel, chase and drill floors, walls, partitions, ceilings and other surfaces necessary for mechanical installations in the manner specified and approved by the architect. Perform cutting by skilled mechanics of the trades involved.
- C. Repair cut surfaces to match adjacent surfaces.

1.10 EXCAVATION FOR MECHANICAL WORK

- A. Description of Work: Types of excavation for mechanical related work specified in this section include:
 - 1. Underground mechanical utilities and services.
 - 2. Underground tanks, casings and equipment enclosures.
 - 3. Exterior water circulation and distribution systems.
- B. Project Conditions.
 - 1. Locate and protect existing utilities and other underground work in manner which will ensure that no damage or service interruption will result from excavating and backfilling. Liabilities arising out of performance of work is responsibility of Contractor doing excavation.
 - 2. Protect persons from injury at excavations by barricades, warnings, and illumination.
 - 3. Provide temporary covering or enclosure and temporary heat as necessary to protect bottoms of excavations from freezing and frost action. Do not install mechanical work on frozen excavation bases or subbases.

1.11 CONCRETE FOR MECHANICAL WORK.

- A. Types of concrete for mechanical related work specified in this section include:
 - 1. Lean concrete backfill to support mechanical work.
 - 2. Encasement of mechanical work.
 - 3. Mechanical equipment foundations and housekeeping pads.
 - 4. Inertia bases for isolation of mechanical work.
 - 5. Rough grouting in and around mechanical work.
 - 6. Patching concrete cuts to accommodate mechanical work.
 - 7. Thrust block.

1.12 REBATES

- A. The Division 15 Contractor shall assist the Owner in applying for any available rebates from manufacturer's, utility companies, etc. on equipment or materials installed under the contract. Provide all required documentation and assist in the completion of applications as required to complete the rebate process. All proceeds from rebates remain the property of the Owner.

PART 2 - PRODUCTS

Reference Section 03300.

PART 3 - EXECUTION

3.01 EXCAVATION - GENERAL

- A. Do not excavate for mechanical work until work is ready to proceed without delay, so that total time lapse from excavation to completion of backfilling will be minimum.
- B. Excavate with vertical sided excavations to greatest extent possible, except where otherwise indicated. Where necessary, provide sheeting and cross bracing to sustain sides of excavation. Remove sheeting and cross bracing during backfilling wherever such removal would not endanger work or other property. Where not removed, cut sheeting off at sufficient distance below finished grade to not interfere with other work.
- C. Width: Excavate for piping with 6" to 9" clearance on both sides of pipe, except where otherwise shown or required for proper installation of pipe joints, fittings, valves and other work. Excavate for other mechanical work to provide minimum practical but adequate working clearances.
- D. Depth for direct support: For work to be supported directly on undisturbed soil, do not excavate beyond indicated depths, and hand excavate bottom cut to accurate elevations, undercut at pipe hubs.
- E. Depth for subbase support: For large piping (6" pipe size and larger), tanks, and where indicated for other mechanical work, excavate for installation of subbase material in depth indicated or, if not otherwise indicated, 6" below bottom of work to be supported.
- F. Depth for unsatisfactory soil or rock conditions: Where directed, (because of unsatisfactory conditions at bottom of indicated excavation), excavate additional depth as directed to reach satisfactory conditions. Backfill with subbase material, compacted as directed, to indicated excavation depth.
- G. Store excavated material (temporarily) near excavation, in manner which will not interfere with or damage excavation or other work. Do not store under trees (within drip line).

1. Dispose of excavated material which is either in excess of quantity needed for backfilling, or does not comply with requirements for backfill material.
 - a. Remove unused material from project site, and dispose of in lawful manner.

3.02 WATER CONTROL

- A. Maintain dry excavations for mechanical work, by removing water. Protect excavations from inflow of surface water. Pump inflow of ground water from excavations, protect excavations from inflow of ground water, by installing temporary sheeting and waterproofing as well as dewatering as required. Provide adequate barriers which will protect other excavations and below grade property from being damaged by water, sediment or erosion from or through mechanical work excavations. Need permit for dewatering - contractor to obtain and pay for.

3.03 BACKFILLING (REFERENCE 02200)

- A. Do not backfill until installed mechanical work has been tested and accepted, wherever testing is indicated.
- B. Install drainage fill where indicated, and tamp to uniform firm density.
- C. Backfill with finely graded subbase material to 6" above wrapped, coated and plastic piping and tanks, and to centerline of other tanks.
- D. Condition backfill material by either drying or adding water uniformly, to whatever extent may be necessary to facilitate compaction to required densities. Do not backfill with frozen soil materials.
- E. Backfill simultaneously on opposite sides of mechanical work, and compact simultaneously, do not dislocate work from installed positions.
- F. Backfill excavations in 8" high courses of backfill material, uniformly compacted to the following densities (% of maximum density, ASTM D1557), using power-driven hand operated compaction equipment.
 1. Lawn and landscaped areas: 85% for cohesive soils, 90% for cohesionless soil.
 2. Paved areas and roadways: 90% for cohesive soils, 95% for cohesionless soils.
- G. Backfill to elevations matching adjacent grades, at time of backfilling excavations for mechanical work. Return surfaces to original condition.

- H. After covering piping with 6" layer of approved fill, employ General Contractor to backfill, compact excavations beneath:
 - 1. New foundations.
 - 2. Slabs on grade.
 - 3. Areas to be paved by General Contractor.

3.04 CONCRETE BASES

- A. Construct concrete equipment bases of dimensions required, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations.

3.05 CONCRETE GENERAL

Reference Section 03300.

3.06 CONCRETE CURING AND PROTECTION

Reference Section 03300.

3.07 MISCELLANEOUS CONCRETE ITEMS

- A. Fill in holes and openings left in concrete structures for passage of work by trade unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.08 CONCRETE SURFACE REPAIRS (REFERENCE 03300)

- A. Repair and patch areas with epoxy or non-shrink grout immediately after removal of forms, when acceptable to Architect/Engineer.
- B. Repair areas, except single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- C. Use epoxy-based mortar for structural repairs, where directed by Architect/Engineer.
- D. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.09 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. Quality Control: Owner's acceptable testing laboratory will perform sampling and testing during concrete placement, which may include the following, as directed by Engineer. This testing

does not relieve Contractor of responsibility of providing concrete in compliance with specifications. Contractor shall perform additional testing as necessary, at no expense to Owner, to ensure quality of concrete.

1. Sampling Fresh Concrete: ASTM.
2. Slump: ASTM, one test for each load at point of discharge.
3. Air Content: ASTM C 173, one for each set of compressive strength (specimens of freshly mixed concrete).
4. Compressive Strength: ASTM, one set for each 50 cu. yds. or fraction thereof of each class and type of concrete; 2 specimens tested at 7 days, 3 specimens tested at 28 days, and one retained for later testing if required.
5. Laboratory Cured Test Cylinders: ASTM.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15014 - CODES, STANDARDS, AND PERMITS

1.01 GENERAL

The entire installation shall be made in accordance with State rules and regulations and shall also conform with the Standards of the National Board of Fire Underwriters for this installation and the local Board of Fire Underwriters having jurisdiction. The installation shall also comply with air pollution requirements of the State of New York and Industrial Code Rule 4 of the State of New York Department of Labor, Board of Standards and Appeals, dated March 31, 1965, and all other ordinances having jurisdiction.

The Contractor shall submit to all authorities having jurisdiction all required applications and shall secure all necessary permits, tests, and inspections required for final approval.

Certain standard and staple materials are described by reference to standard specifications. These standards are as follows:

ASA-B9	Safety Code for Mechanical Refrigeration
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
AWWA	American Water Works Association
CS	Commercial Standard
FS	Federal Specification
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
PDI	Plumbing and Drainage Institute
SMACNA	Sheet Metal and Air Conditioning Contractors Association
USASI	United States of America Standards Institute
UL	Underwriters' Laboratories

New York State Uniform Fire Prevention and
Building Code dated January 1, 1989

A.A.B.C.	Associated Air Balance Council
N.E.B.B.	National Environmental Balancing Bureau

All new equipment shall bear U.L. label and conform to the latest edition of the National Electric code.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15018 - MOTORS AND ELECTRICAL WORK

1. Internal electrical control devices that operate starters, controllers, etc. shall be furnished, installed, and wired under Division 15. Such devices shall be included but not necessarily limited to, devices connected to ducts, damper switches, float switches, electric thermostats, safety devices, limit switches, relays, push button controllers, selector switches, pilot lights, extra interlock contacts, etc.
2. Equipment starters and disconnects shall be provided by the mechanical contractor completely mounted and wired to internal controls and shall be wired to incoming and outgoing control connections. Should integral equipment starters, disconnects or control panels be shipped separately, the mechanical contractor shall be responsible for the proper installation and connections from equipment to same. Incoming and outgoing (line and load) power wiring to starters / disconnect switches shall be performed by the electrical contractor.
3. The integration of the existing temperature control system wiring and controls shall be the responsibility of the Contractor under Division 15. The Contractor shall be fully responsible for the satisfactory operation of new equipment with the temperature control system.
4. All control transformers, control devices, starters, and control wiring furnished shall be properly protected with fuse cutouts and fuses or circuit breakers to conform to the National Electric Code, latest edition. All work shall be performed by a licensed electrician.
5. Each piece of equipment shall be provided with permanent type laminated, black finish, white core, phenolic nameplate. Nameplates should indicate the name and number of the unit, voltage, and any interlock reference. Each starter furnished by the Contractor shall be provided with a permanent type laminated, black finish, white core phenolic nameplate. Nameplate shall indicate the name of the unit controlled and the voltage rating. Nameplate shall be secured with adhesives. Plastic tape type labels will not be accepted.
6. All equipment shall be provided with disconnect means (by Mechanical Contractor).
7. All wiring furnished and installed by the mechanical contractor shall be in strict accordance with the latest edition of the National Electrical Code and all State and Municipal Agencies having jurisdiction. Except as specified otherwise, minimum size wire shall be #14 AWG (control) and #12 AWG (power) and shall be run in rigid galvanized steel conduit except as noted hereinafter. All wire shall be Type THHN or as required by code. All conduit connections to motors shall be made with short lengths of neoprene jacketed galvanized flexible metallic conduit (liquitite).
8. All wire and cable shall be new, manufactured of soft drawn copper of not less than 98% conductivity, conforming to ASTM Specifications and the latest requirements of N.E.C. Wire, and cable shall have 600 volt insulation (unless otherwise noted or specified) of the type specified and shall be of the standard AWG sizes as called for on Drawings or specified.

9. The Contractor shall furnish all labor and material required for the installation of the systems. A brief description of the work is as follows:
- a. Furnish all electrical control wiring for the new equipment and controls.
 - b. Contractor shall apply final finish to insure uniformity.
 - c. All cutting, patching, and painting as required.
 - d. All controls for units as hereinbefore specified and disconnect switches.
 - e. Testing of all mechanical contractor installed wiring as directed.
 - f. Contractor shall perform all work as stated on the documents for fire alarm fan shutdown for all new applicable equipment, unless noted otherwise.
 - g. Contractor shall obtain an approved independent electrical inspection certificate, covering all work performed by an electrical inspection agency serving the locality of the project.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.
 - 1. Submittals.
 - 2. Welder certification.
 - 3. Pipe joining materials and installation instructions common to piping systems.
 - 4. Piping specialties: Escutcheons, dielectric fittings, sleeves and seals.
 - 5. Identifying devices and labels.
 - 6. Nonshrink grout for equipment installations.
 - 7. Drip pans.
 - 8. Fire stopping.
 - 9. Pipe supports: Hangers, clamps, support spacing, building attachments, shields and saddles, flashing, miscellaneous materials, anchors.
 - 10. Field fabricated metal and wood equipment supports.
- B. Pipe and pipe fitting materials are specified in piping system sections.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 SUBMITTALS

- A. General - Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for following piping specialties:
 - 1. Mechanical sleeve seals.
 - 2. Identification materials and devices.
- C. Samples of color, lettering style and other graphic representation required for each identification material and device.
- D. Shop drawings detailing fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- E. Coordination drawings for access panel and door locations.
- F. Prepare coordination drawings according to Division 1 Section 01044-"Composite Drawings" to a 1/4 inch equals 1 foot scale or

larger. Detail major elements, components and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Show where sequence and coordination of installations are important to the efficient flow of the Work. Include the following:

1. Proposed locations of piping, ductwork, equipment and materials. Include the following:
 - a. Planned piping layout, including valve and specialty locations and valve stem movement.
 - b. Planned duct systems layout, including elbows radii and duct accessories.
 - c. Clearances for installing and maintaining insulation.
 - d. Clearances for servicing and maintaining equipment, including space for equipment disassembly required for periodic maintenance.
 - e. Equipment service connections and support details.
 - f. Exterior wall and foundation penetrations.
 - g. Fire-rated wall and floor penetrations.
 - h. Sizes and location of required concrete pads and bases.
- G. Floor plans, elevations and details to indicate penetrations in floors, walls and ceilings and their relationship to other penetrations and installations.
- H. Reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.
- I. Submit weld procedure specifications.

1.04 WELD AND WELDER CERTIFICATION

- A. Welder certificates signed by Contractor certifying that welders comply with requirements of this Section.
- B. Qualify welding processes and operators for structural steel according to AWS D1.1 "Structural Welding Code - Steel".
 1. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
 1. Comply with provisions of ASME B31 Series "Code for Pressure Piping".

1.05 Standards for Materials and Workmanship

- A. All materials and workmanship shall, at a minimum be inaccordance with (in no order of precedence):
 - 1. New York State Codes - latest edition as adopted by the Authority Having Jurisdiction, unless otherwise noted.
 - 2. State and municipal Building Codes and related subcodes.
 - 3. Occupational and Safety Act (OSHA) Requirements.
 - 4. Rules and Regulations of the Authority Having Jurisdiction applicable to the work.
 - 5. National Electrical Standards Association Standard for Good Workmanship in Electrical Construction (NECA-1)
 - 6. Serving utility's rules and regulations for providing service.
 - 7. Contract Drawings and Specifications.
 - 8. Manufacturer recommended installation instructions, practices and procedures for the products being utilized or installed.
 - 9. Where conflicts arise between the above, the more stringent requirement shall be adhered to.

PART 2 - PRODUCTS

2.01 PIPE AND PIPE FITTINGS

- A. Refer to individual piping system specification Sections for pipe and fitting materials and joining methods. Joining methods and pipe installation shall be performed in complete accordance with section 1613 of the Building Code of New York State for building seismic type II, zone C.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.02 PIPE JOINING MATERIALS

- A. Refer to individual piping system specification Sections in Division 15 for special joining materials not listed below.
- B. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8 inch maximum thickness, except where thickness or specific material is indicated.

- a. Full-Face Type: for flat-face, Class 125 cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: for raised-face, Class 250 cast-iron and steel flanges.
- 2. ASME B16.20 for grooved, ring-joint, steel flanges. Note that grooved, ring joint piping / accessories may be used for sprinkler or condenser water piping systems only.
- 3. AWWA C110, rubber, flat face, 1/8 inch thick, except where other thickness is indicated; and full-face or ring type, except where type is indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.
- D. Solder Filler Metal: ASTM B 32.
 - 1. Alloy Sn95 or Alloy Sn94: Tin (approximately 95 percent) and silver (approximately 5 percent).
 - 3. Alloy E: Tin (approximately 95 percent) and copper (approximately 5 percent).
 - 4. Alloy HA: Tin-antimony-silver-copper-zinc.
 - 5. Alloy HB: Tin-antimony-silver-copper-nickel.
 - 6. Alloy Sb5: Tin (95 percent) and antimony (5 percent).
- E. Brazing Filler Metals: AWS A5.8.
 - 1. BCuP Series: Copper-phosphorus alloys.
 - 2. BAgl: Silver alloy.
- F. Welding Fill Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Flanged, Ductile-Iron Pipe Gasket, Bolts and Nuts: AWWA C110, rubber gasket, carbon steel bolts and nuts.
- H. Couplings: Iron body sleeve assembly, fabricated to match outside diameters of plain-end, pressure pipes.
 - 1. Sleeve: ASTM A 126, Class B, gray iron.
 - 2. Followers: ASTM A 47, Grade 32510 or ASTM A 536 ductile iron.
 - 3. Gaskets: Rubber.
 - 4. Bolts and Nuts: AWWA C111.
 - 5. Finish: Enamel paint.

2.03 PIPING SPECIALTIES

- A. Escutcheons: Manufactured wall, ceiling and floor plates; deep-pattern type, where required to conceal protruding fittings and sleeves.

1. Inside Diameter: Closely fit around pipe, tube and insulation of insulated piping.
 2. Outside Diameter: Completely cover opening.
 3. Cast Brass: One-piece, with set-screw.
 - a. Finish: Rough brass.
 - b. Finish: Polished chrome plate.
 4. Cast Brass: Split casting, with concealed hinge and set-screw.
 - a. Finish: Rough brass.
 - b. Finish: Polished chrome plate.
 5. Stamped Steel: One-piece, with set screw and chrome plated finish.
 6. Stamped Steel: One-piece with spring clips and chrome plated finish.
 7. Stamped Steel: Split plate with concealed hinge, set-screw, and chrome plated finish.
 8. Stamped Steel: Split plate with concealed hinge, spring clips and chrome plated finish.
 9. Cast-Iron Floor Plate: One piece casting.
- B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.
 2. Insulating Material: Suitable for system fluid, pressure and temperature.
 3. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F temperature.
 4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system pressures.
 5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers and steel backing washers.
 - a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure to suit system pressures.
 6. Dielectric Couplings: Galvanized steel coupling, having inert and non-corrosive, thermoplastic lining, with threaded ends and 300 psig minimum working pressure at 225 deg F temperature.
 7. Dielectric Nipples: Electroplated steel nipple, having inert and non-corrosive, thermoplastic lining, with combination of plain or threaded end types and 300 psig working pressure at 225 deg F temperature.

- C. Mechanical Sleeve Seals: Modular, watertight, mechanical type. Components include interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve. Connecting bolts and pressure plates cause rubber sealing elements to expand when tightened.
- D. Sleeves: The following materials are for wall, floor, slab and roof penetrations.
 - 1. Steel Sheet-Metal: 24 gage or heavier, galvanized sheet metal, round tube closed with welded longitudinal joint.
 - 2. Steel Pipe: ASTM A53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 - 3. Cast-Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, having plain ends and integral water stop, except where other features are specified.
 - 4. Wall Penetration Systems: Wall sleeve assembly, consisting of housing, gaskets and pipe sleeve, with 1 mechanical-joint end conforming to AWWA C110 and 1 plain pipe-sleeve end.
 - a. Penetrating Pipe Deflection: In accordance with International Building Code (latest edition), Chapter 16: seismic requirements, without leakage.
 - b. Housing: Ductile-iron casting having waterstop and anchor ring, with ductile-iron gland, steel studs and nuts, and rubber gasket conforming to AWWA C111 of housing and gasket size as required to fit penetrating pipe.
 - c. Pipe Sleeve: AWWA C151, ductile-iron pipe.
 - d. Housing-to-Sleeve Gasket: Rubber or neoprene, push-on type, of manufacturer's design.
 - 5. Cast-Iron Sleeve Fittings: Commercially-made, sleeve having integral clamping flange, with clamping ring, bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.

2.04 IDENTIFYING DEVICES AND LABELS

- A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. Where more than single type is specified for listed application, selection is Installer's option, but provide single selection for each product category.
- B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
 - 2. Location: An accessible and visible location.

- C. Snap-On Plastic Pipe Markers: Manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, conforming to ASME A13.1.
- D. Pressure-Sensitive Pipe Markers: Manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, conforming to ASME A13.1.
- E. Plastic Duct Markers: Manufacturer's standard laminated plastic, color coded duct markers. Conform to following color code:
 - 1. Green: Cold air.
 - 2. Yellow: Hot air.
 - 3. Yellow/Green: Supply air.
 - 4. Blue: Exhaust, outside, return and mixed air.
 - 5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
 - 6. Nomenclature: Include following:
 - a. Direction of air flow.
 - b. Duct service (supply, return, exhaust, etc.).
 - c. Duct origin (from).
 - d. Duct destination (to).
 - e. Design cfm.
- F. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock: Grade ES-2, black surface, black phenolic core, with white (letter color) melamine subcore, except when other colors are indicated.
 - 1. Fabricate in sizes required for message.
 - 2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
 - 3. Punch for mechanical fastening.
 - 4. Thickness: 1/16 inch, except as otherwise indicated.
 - 5. Thickness: 1/8 inch, except as otherwise indicated.
 - 6. Thickness: 1/16 inch, for units up to 20 square inches or 8-inches long; 1/8 inch for larger units.
 - 7. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
- G. Plastic Equipment Markers: Laminated-plastic, color-coded equipment markers. Conform to following color code:
 - 1. Green: Cooling equipment and components.
 - 2. Yellow: Heating equipment and components.
 - 3. Yellow/Green: Combination cooling and heating equipment and components.
 - 4. Brown: Energy reclamation equipment and components.
 - 5. Blue: Equipment and components that do not meet any of above criteria.
 - 6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
 - 7. Nomenclature: Include following, matching terminology on schedules as closely as possible:
 - a. Name and plan number.
 - b. Equipment service.

- c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm.
8. Size: Approximately 2-1/2 by 4 inches for control devices, dampers, and valves; and 4-1/2 by 6 inches for equipment.

H. Underground Type Plastic Line Marker.

- 1. Manufacturer's standard permanent, bright colored, continuous printed plastic tape, intended for direct burial service, not less than 6" wide x 4 mils thick. Provide tape with printing which most accurately indicates type of service of buried pipe.
- I. Lettering and Graphics: Coordinate names, abbreviations and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
- 1. Multiple Systems: Where multiple systems of same generic name are indicated, provide identification that indicates individual system number as well as service such as "Boiler No. 3", "Air Supply No. 1H", or "Standpipe F12".

2.05 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C1107, Grade B.
- 1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000 psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory-packaged.

2.06 DRIP PANS

- A. Provide drip pans fabricated from corrosion resistant sheet metal with watertight joints, and with edges turned up 2-1/2 inches. Reinforce top, either by structural angles or by folding over according to size. Provide hole, gasket, and flange at low point for watertight joint and 1-inch drain line connection.

2.07 FIRE STOPPING

- A. Refer to Specification Section 15511 for details.

2.08 HORIZONTAL PIPING HANGERS AND SUPPORTS

- A. General: Except as otherwise indicated, provide factory fabricated horizontal piping hangers and supports. Supports and hangers in conformance with International Building Code (latest

edition), Chapter 16: seismic requirements shall be used. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper plated hangers and supports for copper piping systems. Provide spring hangers where piping is subject to vibration movement.

B. Adjustable steel clevises.

1. Material: Carbon steel, copper plated for copper piping.
2. Finish: Black or copper plated.
3. Adjustment: Hanger to be adjustable for vertical height of pipe without removing the pipe.

2.09 VERTICAL PIPING CLAMPS

A. Two bolt riser clamp.

1. Material: Carbon steel copper plated for copper piping.
2. Finish: Black or copper plated.

2.10 HANGER ROD AND SPACING

ROD SIZE AND SPACING SCHEDULE (In accordance with NYSBC 1621)

<u>PIPE SIZE</u>	<u>ROD DIAMETER</u>
2" and smaller	3/8"
2-1/2" thru 3-1/2"	1/2"
4" thru 5"	5/8"
6" and over	3/4"

<u>TYPE</u>	<u>MAXIMUM SPACING</u>
Steel	10' - 0"
Copper	6' - 0"

Note: Cast Iron - support at every hub or coupling 5 ft. maximum spacing.

2.11 BUILDING ATTACHMENTS

A. General: Except as otherwise indicated provide factory fabricated building attachments of one of the following types listed, selected by Installer to suit building substrate conditions. Select size of building attachments to suit hanger rods. Provide copper plated building attachments for copper piping systems. Provide the following where approved by International Building Code (latest edition), Chapter 16:

B. On Structural Steel:

1. For pipes 2" and smaller: C clamps with lock nuts similar to Grinnell figure 86.
2. For pipes 5" and larger: Use beam clamps similar to Grinnell figure 228 or 292.

C. On New Masonry:

1. Use concrete inserts similar to Grinnell figure 281.

D. On Existing Concrete:

1. Use expansion case similar to Grinnell figure 117.

E. On Wood:

1. Use coach screw rods Grinnell figure 111. Ceiling flanges Grinnell figure 153, or fabricated angle clips. Use wood drive screws or lag bolts as fasteners.

2.12 SHIELDS AND SADDLES (Where approved by International Building Code (latest edition), Chapter 16:)

A. General: For insulated piping.

B. Shields: 16 gauge galvanized metal.

Unsul Coustic Corp. "Insul-Shield"

C. Protection saddles:

1. Hardwood block
2. Steel saddle Grinnell 160 series

2.13 FLASHING MATERIALS

A. General: Provide flashings for each penetration of mechanical systems through roofs or waterproof membranes.

B. Molded Pipe Flashing: Compatible with single ply membranes with which it is used and manufactured by membrane manufacturer.

C. Copper flashing: Provide cold-rolled sheet copper (ANSI/ASTM B 370), of proper temper for applications shown and required forming, coated on one side with not less than 0.06 lbs. per sq. ft. of antimony (ANSI/ASTM B 101, Type I, Class A), weighing 1.06 lbs. per sq. ft., except as otherwise indicated.

D. Bituminous coating: FS TT-C-494, or MIL-C-18480, or SSPC-Paint 12, cold applied solvent type bituminous mastic coating for application in dry film thickness of 15 mils per coat.

2.14 MISCELLANEOUS MATERIALS

A. Metal framing: Provide products complying with NEMA STD ML 1.

- B. Steel plates, shapes and bars: Provide products complying with ANSI/ASTM A 36.
- C. Heavy duty steel trapezes: Fabricate from steel shapes selected for loads required, weld steel in accordance with AWS standards.
- D. Pipe guides: Provide factory fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of a bolted two section outer cylinder and base with a two section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

2.15 ANCHORS

- A. Fabricate pipe anchors from 3 x 3 x 1/2" angle.
- B. Use pipe protection saddles one size larger than piping.

PART 3 - EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: All piping systems, components and their installation shall be in conformance with the International Building Code (latest edition), Chapter 16: for seismic requirements. Install piping as described below, except where system Sections specify otherwise. Individual piping system specification Sections in Division 15 specify piping installation requirements unique to the piping system.
- B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordinate drawings.
- C. Install piping at indicated slope.
- D. Install components having pressure rating equal to or greater than system operating pressure.
- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.

- H. Install piping tight to slabs, beams, joists, columns, walls and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's printed instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wallboard partitions and suspended ceilings according to the following:
 - 1. Chrome-Plated Piping: Cast-brass, one-piece, with set-screw and polished chrome-plated finish. Use split-casting escutcheons where required, for existing piping.
 - 2. Uninsulated Piping Wall Escutcheons: Cast-brass or stamped-steel, with set-screw.
 - 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 - 4. Insulated Piping: Cast-brass or stamped-steel, with concealed hinge, spring clips and chrome-plated finish.
 - 5. Piping in Utility Areas: Cast-brass or stamped-steel with set-screw or spring clips.
- N. Sleeves are required for core drilled holes.
- O. Permanent sleeves are not required for holes formed by PE plastic (removable) sleeves.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, concrete floor and roof slabs and where indicated.
 - 1. 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. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring where specified.
 - 2. Build sleeves into new walls and slabs as work progresses.
 - 3. Install large enough sleeves to provide 1/4 inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

- a. Steel Sheet-Metal Sleeves: For pipes 6 inches and larger, penetrating gypsum-board partitions.
 - b. Cast-Iron Sleeve Fittings: For floors having membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Flashing is specified in Division 7 Section "Flashing and Sheet Metal".
 - c. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
- 4. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants specified in Division 7 Section "Joint Sealants".
- Q. Above Grade, Exterior Wall, Pipe Penetrations: Seal penetrations using sleeve and mechanical sleeve seals. Size sleeve for 1 inch annular clear space between pipe and sleeve for installation of mechanical seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger.
 - 3. Assemble and install mechanical seals according to manufacturer's printed instructions.
- R. Below Grade, Exterior Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.
- S. Below Grade, Exterior Wall, Pipe Penetrations: Install ductile-iron wall penetration system sleeves according to manufacturer's printed installation instructions.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- V. Piping Joint Construction: Joint pipe and fittings as follows and as specifically required in individual piping system specification Sections.
 - 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - 3. Soldered Joints: Construct joints according to AWS "Soldering Manual", Chapter 22 "The Soldering of Pipe and Tube".
 - 4. Brazed Joints: Construct joints according to AWS "Brazing Manual", Chapter 28 "Pipe and Tube".

5. 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 inside diameter. Join pipe fittings and valves as follows:
 - a. Note the internal length of threads in fittings or valve ends and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- W. Welded Joints: Construct joints according to AWS D10.12 "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe" using qualified processes and welding operators according to "Quality Assurance" article.
- X. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
 1. Fitting Heat-Fusion Joints: Prepare pipe and fittings and join with heat-fusion equipment, according to manufacturer's printed instructions.
 - a. Plain-End Pipe and Socket-Type Fittings: Socket-joining.
- Z. Piping Connections: Except as otherwise indicated, make piping connections as specified below.
 1. Install unions, in piping 2 inches and smaller, adjacent to each valve and at final connection to each piece of equipment having 2 inches or smaller threaded pipe connection.
 2. Install flanges, in piping 2 1/2 inches and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
 3. Dry Piping Systems (Gas, Compressed Air, and Vacuum): Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 4. Wet Piping Systems (Water and Steam): Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.02 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide the maximum possible headroom, where mounting heights are not indicated. Equipment platforms, vibration isolation and restraints shall be provided and installed where described and shall be in conformance with International Building Code (latest edition), Chapter 16:
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to the Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.
- D. Install mechanical equipment to facilitate servicing, maintenance and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
- E. Install equipment giving right-of-way to piping systems installed at a required slope.

3.03 LABELING AND IDENTIFYING

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 - 1. Plastic markers, with application systems. Install on pipe insulation segment where required for hot non-insulated pipes.
 - 2. Locate pipe markers as follows wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.
 - a. Near each valve and control device.
 - b. Near each branch, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
 - c. Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.
 - d. At access doors, manholes and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at a maximum of 50 feet intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.
 - g. On piping above removable acoustical ceilings, except omit intermediately spaces markers.
 - 3. During back-filling/top-soiling of each exterior underground piping systems, install continuous underground type plastic line marker, located directly over buried line

at 6-inches to 8-inches below finished grade. Where multiple small lines are buried in common trench and do not exceed overall width of 16-inches, install single line marker. For tile fields and similar installations, mark only edge pipe lines of field.

- B. Equipment: Install engraved plastic laminate sign or equipment marker on or near each major item of mechanical equipment.
 - 1. Lettering Size: Minimum 1/4 inch high lettering for name of unit where viewing distance is less than 2 feet, 1/2 inch high for distance up to 6 feet, and proportionately larger lettering for greater distances. Provide secondary lettering 2/3 to 3/4 of size of principal lettering.
 - 2. Text of Signs: Provide text to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to name of identified unit.
- C. Duct Systems: Identify air supply, return, exhaust, intake and relief ducts with duct markers, or provide stenciled signs and arrows, showing duct system service and direction of flow.
 - 1. Location: In each space where ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet.
- D. Adjusting: Relocate identifying devices which become visually blocked by work of this Division or other Divisions.

3.04 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Provide and install in conformance with International Building Code (latest edition), Chapter 16: Cut, fit and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1 "Structural Welding Code - Steel".

3.05 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish

materials. Make tight connections between members. Install fasteners without splitting wood members.

- C. Attach to substrates as required to support applied loads.

3.06 GROUTING

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms for placement of grout, as required.
- D. Avoid air entrapment when placing grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases to provide a smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout according to manufacturer's printed instructions

3.07 DRIP PANS

- A. Locate drip pans under piping passing over or within 3 ft. horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, and weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1-inch drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.

3.08 FIRESTOPPING

- A. See section 15511 for additional fire stopping requirements.

3.09 INSTALLATION OF BUILDING ATTACHMENTS

- A. Install building attachments at required locations in concrete, in wood or on structural steel for proper piping support. Space attachments within maximum piping span length indicated. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed, fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.10 INSTALLATION OF HANGERS AND SUPPORTS

- A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure. Supports / hangers shall conform to the requirements of International Building Code (latest edition), Chapter 16: Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Install hangers and supports of same type and style for grouped piping runs.
- C. Support fire water piping independently of other piping.
- D. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.
- E. Provisions for movement: International Building Code (latest edition), Chapter 16:
 - 1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
 - 2. Load distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
 - 3. Pipe slopes: Install hangers and supports to provide indicated pipe slopes.
- F. Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.

3.11 SHIELDS AND SADDLES FOR INSULATED PIPING

- A. 4" and below use 16 gauge x 12 inch long shield with oversized hanger outside insulation.
- B. 6" and above use hardwood protection saddle with 16 gauge x 18 inch long shield with oversized hanger outside insulation.
- C. 6" and above use steel protection saddle. Fill void between shield and pipe with insulation. Cover with vapor barrier. Protect barrier with 16 gauge x 18 inch long shield with oversized hanger outside assembly.

3.12 INSTALLATION OF ANCHORS

- A. Install anchors at proper locations to prevent stresses and to prevent transfer of loading and stresses to connected equipment.

- B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure.
- C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximums recommended by manufacturer for each unit.
- D. Anchor spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.13 FLASHINGS

- A. Manufacturer's recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of sheet metal being installed.
- B. Coat back side of flashings where in contact with concrete and other cementitious substrates, by painting surface in area of contact with heavy application of bituminous coating, or by other permanent separation as recommended by manufacturer of metal.
- C. On vertical surfaces, lap flashings minimum of 3".
- D. On sloping surfaces, for slopes of not less than 6" in 12", lap unsealed flashings minimum of 6".
- E. For embedment of metal flashing flanges in roofing or composition flashing or stripping, extend flanges minimum of 6" for embedment.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15055 - PAINTING OF MECHANICAL WORK

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Types of painting of mechanical related work specified in this section include the following:
 - 1. Exposed piping systems.
 - 2. Exposed ductwork systems.
 - 3. Steel supports, hangers and rods.
- B. The scope of painting to be applied as part of the work under Division 15 shall consist of the following:
 - 1. Paint exposed mechanical work throughout entire project including piping, ductwork, and terminal HVAC equipment.
 - 2. Paint uninsulated ductwork and equipment.
 - 3. Paint exposed NON insulated pipe, black steel such as pipe hangers, supporting steel, tanks, and equipment having no prime or only a prime coat finish.

1.02 SUBMITTALS

- A. Submit manufacturer's technical information, including analysis of ingredients and application instructions for products used in painting work.
- B. Certification by the manufacturer that products supplied comply with State VOC Regulations

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver painting materials to job site in original, new and unopened containers bearing manufacturer's name and label showing the following information:
 - 1. Name and title of material.
 - 2. Manufacturer's stock number and date of manufacture.
 - 3. Contents by volume, for major pigments and vehicles.
 - 4. Thinning instructions.
 - 5. Application instructions.
 - 6. Color name and number.
- B. Store materials in approved fire-safe location with adequate ventilation. Area must be kept clean.

1.04 PROJECT CONDITIONS

- A. Comply with governing regulations concerning use of and conditions for application of paint. Comply with manufacturer's recommendations and instructions. Do not apply paint in unfavorable conditions of temperature, moisture (including humidity) or ambient contamination (dust and other pollutants).

PART 2 - PRODUCTS

2.01 GENERAL PAINTING PRODUCT REQUIREMENTS

- A. Painting products based on a system by Rust-Oleum. Equivalent systems by Devoe and Pratt and Lambert are acceptable.
- B. Steel surfaces - normal temperatures:
 - 1. First Coat - Rust-Oleum or equal Red Primer.
 - 2. Second Coat - Rust-Oleum or equal Zinc Chromate Rust-Inhibitive Primer.
 - 3. Third Coat - Rust-Oleum industrial enamels, finish color as directed.
- C. Steel surfaces - elevated temperatures above 150 deg. F.
 - 1. First Coat - Rust-Oleum or equal heat resistant primer.
 - 2. Second Coat - Rust-Oleum or equal heat resistant aluminum.
 - 3. Machinery, equipment and apparatus having factory applied prime coat shall be painted as specified above except omit first coat.
- D. Exposed canvas on pipe and equipment insulation:
 - 1. First Coat - Primer, Rust-Oleum primer-sealer.
 - 2. Second and third coats - Rust-Oleum Acrylic Series.
 - 3. Colors as directed.
- E. Vehicles and thinners: Comply with governing regulations and recognized safe practices in handling, use and drying of paint vehicles and thinners. Compatibility of paint products is the Contractor's exclusive responsibility. Select paint products to ensure freedom from problems relating to vehicles and thinners of type and within limits recommended by paint manufacturer.

PART 3 - EXECUTION

3.01 GENERAL

- A. Clean surfaces before applying paint products. Remove oil and grease prior to mechanical cleaning. Comply with paint products manufacturer's instructions for surface cleaning and preparation.

Remove surface applied accessories which are not to be painted, and reinstall after completion of painting. Protect non-removable items not to be painted, by covering with paper or plastic film.

- B. Ferrous metal surfaces: Remove mill scale and loose rust on surfaces which are not zinc coated or shop/factory prime coated.
 - 1. Clean shop applied prime coats on metal surfaces, and repair (touch-up) prime coats wherever abraded or otherwise damaged, prior to application of paint system.
- C. Zinc coated surfaces: Clean with non-petroleum based solvent. Wash with copper sulfate solution and flush with water, unless surface has been pre-treated, or unless treatment is not recommended by manufacturer of prime coat.

3.02 PAINT SYSTEM APPLICATION

- A. Comply with manufacturer's recommendations for mixing or stirring paint products immediately before application.
- B. Application limitations: Paint every accessible surface of each unit of work indicated to be painted, regardless of whether in location recognized as "concealed" or "exposed" except as otherwise indicated.
 - 1. Omit painting of ductwork and insulated piping above removable ceilings, but apply paint system to pipe hangers, duct hangers and similar unprotected ferrous materials.
 - 2. Omit painting on machined sliding surfaces and rotating shafts of equipment, and on nonferrous finished metals including chrome plate, stainless steel, special anodized aluminum, brass/bronze and copper, and on plastics and similar finished materials, except where specifically indicated to be color-coded by painting.
 - 3. Omit painting on required name plates, labels, identification tags, signs, markers, printed instructions, performance ratings, flow diagrams and similar text and graphics, located within the scope of work indicated to receive paint application.
 - 4. Omit specified prime coat of paint system for metal surfaces where surface has shop applied prime coat of equivalent quality. Apply prime coat on other surfaces to be painted, comply with paint manufacturer's instructions for prime coating where not otherwise indicated. Apply additional prime coats where suction spots or unsealed areas appear.
- C. Apply paint in accordance with manufacturer's directions. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance.

Apply paint at edges, corners, joints, welds and exposed fasteners in manner which will ensure dry-film thickness equal to that of flat surfaces. Allow sufficient time between successive coats for proper drying (comply with manufacturer's drying instructions).

- 1. Number of coats: Number indicated is minimum number, apply as many coats as are necessary to cover.

2. Coating thickness: Apply paint in uniform coats without thinning in application thickness recommended by manufacturer for each coat.
3. Apply paint in smooth finish without noticeable texture, cloudiness, spotting, holidays, laps, brush marks, runs, sags, ripples, ropiness and other surface imperfections.

3.03 CLEAN UP AND PROTECTION, PAINTING

- A. During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day. Do not leave in paint storage area.
- B. Spattered surfaces: Upon completion of painting work, clean paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting work. Correct damage by cleaning, repairing or replacing and repainting as directed. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings installed for protection of work not to be painted, after completion of painting operations. At completion of work by other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15100 - VALVES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Extent of valves required by this section is indicated on drawings and/or specified in other Division 15 sections.
- B. Types of valves specified in this section include the following:
 - 1. Gate valves.
 - 2. Globe valves
 - 3. Drain valves.
 - 4. Ball valves.
 - 5. Butterfly valves (where specifically approved by engineer only).
 - 6. Check valves.
 - a. Wafer Check (where specifically approved by engineer only).

1.03 QUALITY ASSURANCE

- A. Marking of valves - comply with MSS SP-25.
- B. Valve dimensions - for face-to-face and end-to-end dimensions of flanged or welding end valve bodies, comply with ANSI B16.10.
- C. ASME Compliance: ASME 1331.9 for Building Services Piping.
- D. Valve types. Provide valves of same type by same manufacturer.

1.04 SUBMITTALS

- A. Product data - submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing manufacturer's figure number, size, location and valve features for each required valve.
- B. Maintenance data - submit maintenance data and spare parts lists for each type of valve. Include this data in Maintenance Manual.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle valves and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged valves or components, replace with new.
- B. Store valves and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide factory fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated, provide proper selection as determined by installer to comply with installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is engineer's option.
- B. Valve Features
 - 1. Bypass- when shown provide manufacturer's standard bypass piping and valving.
 - 2. Drain - when shown provide threaded pipe plugs complying with Division 15 "Hot & Chilled water piping" section.
 - 3. Flanged - valve flanged complying with ANSI B16.1 (cast iron), ANSI B16.5, (steel), or ANSI B16.24 (bronze).
 - 4. Threaded - valve ends complying with ANSI B2.1
 - 5. Solder joint - valve ends complying with ANSI B16.18.
 - 6. Trim - fabricate pressure containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry.
 - 7. Renewable seat - design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.
 - 8. Extended stem - increase stem length 2" minimum, to accommodate insulation applied over valve.
- C. Valve Definitions
 - 1. Mechanical actuator - factory fabricated gears, gear enclosure, external chain attachment and chain designed to provide mechanical advantage in operating valve.
 - 2. Bonnet - part of gate or globe valve through which stem passes to valve body, and attached to valve body by screws, bolts union, or welding.
 - 3. Solid wedge - one piece tapered disc in gate valve, designed for contact on both sides.
 - 4. Outside screw and yoke (OS&Y) - stem and handwheel designed to rise out of bonnet or yoke as valve is operated from closed to open position.
 - 5. Inside screw, non-rising stem - stem and handwheel designed to rotate without rising when valve is operated from closed to open position.
 - 6. Tight shutoff - butterfly valve designed for flow regulation, and manufactured to be tight in closed position.

2.02 GLOBE VALVES

- A. Packing - select valves designed for repacking under pressure when fully opened, equipped with packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.
- B. Composition discs - where required, provide suitable material for intended service. For stem throttling service, fit composition disc valve with throttling nut. For metal seated globe valves, provide hardened stainless steel disc and seat ring.

C. Comply with the following standards:

1. Cast iron valves - MSS SP-85.
2. Bronze valves - MSS SP-80.
3. Steel valves - ANSI B16.34.

D. For HVAC hot and chilled water service:

1. Threaded ends 2" and smaller - Class 150, bronze body, union bonnet, rising stem, composition disc.
2. Soldered ends 2" and smaller - Class 125, bronze body, screwed bonnet, rising stem, composition disc.
3. Flanged ends 2 1/2" and larger - Class 125, iron body, bolted bonnet, rising stem, OS&Y, renewable seat and disc.

E. Manufacturer - subject to compliance with requirements, provide globe valves of one of the following:

1. Jenkins Bros, A Corp.
2. Kennedy Valve
3. Stockham Valves and Fittings, Inc.

2.03 DRAIN VALVES

A. For low pressure drainage service:

1. Threaded ends 2" and smaller - Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.
2. Soldered ends 2" and smaller - Class 125, bronze body, screwed bonnet, rising stem, composition disc, 3/4" hose outlet connection.

B. Manufacturer - subject to compliance with requirements, provide drain valves of one of the following:

1. NIBCO, Inc.
2. Watts

2.04 BALL VALVES

A. Comply with the following standards:

1. Cast iron valves - MSS SP-72.
2. Steel valves - ANSI B16.34.

B. For HVAC hot and chilled water service:

1. Threaded ends 2" and smaller - Class 125, bronze 2 piece body, full port, bronze ball, bronze stem.
2. Soldered ends 2" and smaller - Class 125, bronze 2 piece body, full port, bronze ball, bronze stem.

C. Manufacturer - subject to compliance with requirements, provide ball valves of one of the following:

1. Jenkins Bros.
2. Stockham Valves & Fittings
3. Watts

2.05 BUTTERFLY VALVES (only where specifically approved by the engineer)

A. General - comply with MSS SP-67. Valves to be tight shutoff.

Where butterfly valves are used as shutoffs for terminal or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on butterfly valves 8" and larger.

- B. For HVAC hot and chilled water service:
 - 1. Lug type 3" and larger - Class 150, ductile iron body, lever operated, cadmium plated ductile iron disc, Type 316 stainless steel stem, EPT or EPDM seat.
- C. Manufacturer - subject to compliance with requirements, provide butterfly valves of one of the following:
 - 1. Demco Inc.
 - 2. Jenkins Bros., A Corp.
 - 3. Mark Controls Corp., MCC Centerline.
 - 4. Stockham Valves and Fittings, Inc.
 - 5. Crane Co., Valve Division

2.06 WAFER CHECK VALVES (only where specifically approved by the engineer)

- A. General - provide wafer style, butterfly type, spring actuated check valves designed to be installed with gaskets between two standard Class 125 flanges. Construct iron body valves with pressure containing parts of materials conforming to ANSI/ASTM A-126, Grade B. Support hanger pins on both ends by removable side plugs.
- B. For water service:
 - 1. 2" and larger - Class 125, cast iron body, stainless steel trim, bronze disc, Buna-N seal.
- C. Manufacturer - subject to compliance with requirements, provide wafer check valves of one of the following:
 - 1. Bell & Gossett, ITT Fluid Handling Div.
 - 2. Metraflex Co.
 - 3. NIBCO, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General - except as otherwise indicated, comply with the following requirements:
 - 1. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.
 - 2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for horizontal plane unless unavoidable. Install valve drains with hose end adapter for each valve that must be installed with stem below horizontal plane.
- B. Insulation - where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.
- C. Applications subject to shock - install valves with bodies of metal other than cast iron where thermal or mechanical shock is

indicated or can be expected to occur.

- D. Applications subject to corrosion - do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator. Install bronze valves in steam and condensate service and in other services where corrosion is indicated or can be expected to occur.
- E. Mechanical actuators - install mechanical actuators with chain operators where indicated, and where valves 4" and larger are mounted more than 7'-0" above floor in mechanical rooms, boiler rooms, and where recommended by valve manufacturer because of valve size, pressure differential or other operating condition making manual operation difficult.
- F. Selection of valve ends (pipe connections) - except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections.
 - 1. Copper tube size 2" and smaller - soldered joint valves except ball valves used in plumbing systems.
 - 2. Steel pipe, size 2" and smaller - threaded valves.
 - 3. Pipe size 2 1/2" and larger - flanged valves.
- G. Valve system - select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.
- H. Non-metallic disc - limit selection and installation of valves with non-metallic discs to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.
- I. Renewable seats - select and install valves with renewable seats, except where otherwise indicated.
- J. Fluid control - except as otherwise indicated, install gate, ball, globe, and butterfly valves to comply with ANSI B31.1. Where throttling is indicated or recognized as principal reason for valve, install globe or butterfly valves.
- K. Installation of Check valves: Wafer check valves - install between two flanges in horizontal or vertical position for proper direction of flow.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15135 - THERMOMETERS AND GAGES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Thermometers and gages specified in this section include the following:
1. Thermometers and fittings:
 2. Pressure gages and fittings:

PART 2 - PRODUCTS

2.01 THERMOMETERS

- A. Thermometers:
1. General: Provide and install adjustable, variable angle type thermometers of materials, capacities and ranges indicated.
 2. Case: Die cast aluminum finished in baked epoxy enamel, glass front, 9 inches long.
 3. Adjustable joint: 180 degree adjustment in vertical plane, 360 degree adjustment in horizontal plane, with locking device.
 4. Tube and capillary: Blue liquid filled, magnifying lens, 1-percent scale range accuracy, shock mounted. (Mercury filled not acceptable).
 5. Scale: Satin faced, non-reflective aluminum, permanently etched markings.
 6. Stem: Copper plated steel, or brass, for separable socket.
 7. Range: Conform to the following:
 - a. Hot water: 30 to 240 degrees F with 2 degree F scale divisions.
 - b. Chilled water: 30 to 180 degrees F with 2 degrees F scale divisions.
 8. Manufacturer:
 - a. Wika
 - b. Trerice
 - c. Weiss
 - d. Or approved equal
- B. Dial Thermometers:
1. General - Provide dial bimetal type adjustable angle thermometers of materials, capacities and ranges indicated, designed and constructed for use in service indicated.
 2. Case - Type 300 series stainless steel hermetically sealed.

3. Dial - White finished aluminum with black and blue marking.
 4. Pointer - balanced aluminum with black finish.
 5. Stem - type 300 series stainless steel 1/4"o.d.internal bimetal coil silicone dampened.
 6. Range - conform to the following:
 - a. Hot water 20° to 240° F. scale divisions.
 7. Manufacturer - subject to compliance with requirements, provide glass thermometers of one of the following:
 - a. Tel-Tru Mfg. Co.
 - b. Trerice (H.O.) Co.
 - c. Weiss Instrument Inc.
- B. Thermometer wells:
1. General: Provide thermometer wells of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2 inch extension for insulated piping. Provide cap nut with chain fastened permanently to thermometer well.
 2. Manufacturer: Same as thermometers.

2.02 PRESSURE GAGES AND FITTINGS

- A. Pressure gages:
1. General: Provide "AA" industrial rated liquid filled pressure gages of capacities and ranges indicated, designed and constructed for use in service indicated. All pressure gauges shall be liquid filled unless otherwise specified. Provide gauge cocks for all pressure gauges.
 2. Type: General use, 1/2 percent accuracy, ANSI B 40.1 grade A, phosphor bronze bourdon type, bottom connection.
 3. Case: Aluminum or brass, glass lens, 4 1/2 inch diameter.
 4. Connector: Brass with 1/4 inch male NPT. Provide protective syphon when used for steam service.
 5. Scale: White coated aluminum, with permanently etched markings.
 6. Range: Conform to the following:
 - a. Water - 0 - 100 psi.
 7. Manufacturer - subject to compliance with requirements, provide pressure gages of one of the following:
 - a. Ametek, U.S. Gage Div.
 - b. Trerice
 - c. Weiss

B. Pressure gage accessories:

1. Gage cocks: Brass cock with 1/4 inch female NPT on each end, and "T" handle brass plug.
2. Syphon: 1/4 inch straight coil constructed of brass tubing with 1/4 inch male NPT on each end.
3. Snubber: 1/4 inch brass bushing with corrosion resistant porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.
4. Manufacturer: Same as gages.

PART 3 - EXECUTION

3.01 INSTALLATION OF THERMOMETERS

- A. General: Install temperature gages in vertical upright position, and tilted so as to be easily read by observer standing on floor.
- B. Locations: Install in the following locations and elsewhere as indicated:
1. At inlet and outlet of each hydronic zone 3-way valve.
 2. At inlet and outlet of each hydronic boiler and chiller.
 3. At inlet and outlet of each hydronic coil in air handling units, and built-up central systems.
 4. At inlet and outlet of each hydronic heat exchanger.
 5. At inlet and outlet of each hydronic heat recovery unit.
 6. At inlet and outlet of each thermal storage tank.
 7. At outlet of domestic hot water heater.
 8. Common boiler supply and return header.
- C. Thermometer wells: Install in piping tee where indicated, in vertical upright position. Fill well with Thermal grease.

3.2 INSTALLATION OF PRESSURE GAGES

- A. General: Install pressure gages in piping tee with pressure gage cock, located on pipe at most readable position.
- B. Locations: Install in the following locations, and elsewhere as indicated:
1. At suction and discharge of each hydronic pump.
 2. At discharge of each pressure reducing valve.
 3. At water service outlet.
 4. At inlet and outlet of water side for condensers, chillers, and cooling towers.
 5. System makeup water line.
 6. Accessible high point of hydronic piping systems.
- C. Pressure gage cocks: Install in piping tee with snubber or syphon if steam.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15160 - EXPANSION COMPENSATION

PART 1 - GENERAL

1.1 SUMMARY OF ITEMS INCLUDED

- A. Expansion compensation products required for this project shall be provided and installed in accordance with section 1621 of the New York State Building Code.
- B. Expansion compensation products specified in this section include:
 - 1. Fabricated Expansion Loops.
 - 2. Flexible Ball Pipe Joints.
 - 3. Expansion Compensators.

1.2 QUALITY ASSURANCE

- A. Refer to Section 01400 "Quality Control", for requirements pertaining to substitute materials and equipment.
- B. Comply with standards of the Expansion Joint Manufacturer's Association (EJMA).

1.3 SUBMITTALS

- A. Product Data: Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of expansion compensation product. Submit schedule showing manufacturer's figure number, size, and location on project.
- B. Shop Drawings: Submit shop drawings for fabricated expansion loops indicating location, dimensions, pipe sizes and location and method of attachment of anchors.
- C. Maintenance Data: Submit maintenance data and spare parts list for each type of expansion compensation product. Include this data in Maintenance Manual.

PART 2 - PRODUCTS

2.1 EXPANSION LOOPS

- A. General: Fabricate expansion loops as dimensioned and located on the Drawings and elsewhere as determined by installer to provide for adequate control of expansion of the installed piping system. Cold spring the loop prior to connecting to the anchored piping.

2.2 FLEXIBLE BALL PIPE JOINTS

- A. General: Provide flexible ball pipe joints where indicated for piping systems, with materials and pressure/temperature ratings selected by Installer to suit intended service. Design joints for 360 degree rotation and with minimum of 30 degree angular

flexing movement for sizes 1/4" to 6", 15 degrees for sizes 8" to 30". Provide 2 composition gaskets for each joint.

- B. Certify carbon steel joints for environmental shock testing in accordance with MIL-S-4456 or MIL-S-901C.
- C. Comply with Section II of ASME Boiler and Pressure Vessel Code and ANSI B31.1 Power Piping for materials and design of pressure containing parts and bolting.
- D. Test each assembly with steam at working pressure of piping system for zero leaks before shipment.
- E. Manufacturer: Subject to compliance with requirements, provide flexible ball pipe joints of the following:
 - 1. Gustin-Bacon Div., Aeroquip Corp.

2.3 EXPANSION COMPENSATORS

- A. Low Pressure: 70 psi, 3/4 inch to 3 inch copper pipe, 2 ply phosphor bronze bellows, brass shroud, male copper tube end.
- B. High Pressure: 150 psi, 3/4 inch to 3/ inch steel pipe, 2 ply seamless stainless steel bellows, steel shroud and male thread end or psi, 3/4 inch to 3 inch copper pipe all bronze construction male thread or sweat ends.
- C. Manufacturer: Subject to compliance with requirements, provide expansion compensators of one of the following:
 - 1. Flexonics Div., UOP, Inc.
 - 2. Keflex, Mfg. Div.
 - 3. Metraflex Co.
 - 4. Vibration Mountings and Controls, Inc.

2.4 PIPE ALIGNMENT GUIDES

- A. General: Provide pipe alignment guides on both sides of expansion joints and elsewhere as indicated. Construct with 3 or 4 finger spider traveling inside a guiding sleeve, with provision for anchoring to building substrate.
- B. Manufacturer: Subject to compliance with requirements, provide pipe alignment guides of the following:
 - 1. Flexonics Div., UOP, Inc.
 - 2. Keflex Mfg. Div.
 - 3. Metraflex Co.

2.5 PIPE ANCHORS

- A. General: Fabricated anchor, coupling with steel angle clips, teflon lined clamp sleeve, or shaped anchor for welding to pipe.
- B. Manufacturer: Subject to compliance with requirements, provide anchors of the following:
 - 1. Flexonics Div., UOP, Inc.
 - 2. Keflex Mfg. Div.

PART 3 - EXECUTION

3.1 EXPANSION LOOPS

- A. General: Fabricate expansion loops as indicated, in locations indicated, and elsewhere as determined by Installer for adequate expansion of installed piping system. Subject loop to cold spring which will absorb 50 percent of total expansion between hot and cold conditions. Provide pipe anchors and pipe alignment guides as indicated, and elsewhere as determined by Installer to properly anchor piping in relationship to expansion loops.

3.2 EXPANSION COMPENSATION FOR RISERS AND TERMINALS

- A. General: Install connection between piping mains and risers with at least 5 pipe fittings including tee in main. Install connections between piping risers and terminal units with at least 4 pipe fittings including tee in riser.

3.3 PIPE ALIGNMENT GUIDES AND ANCHORS

- A. General: Install alignment guides on both sides of each expansion joint or loop. Provide anchors secured to building structure as required.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15182 - STEAM AND CONDENSATE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes steam and condensate piping and specialties for systems up to 125 psig (860 kPa), inside the building.
- B. Related Sections include the following:
 - 1. Division 15 Section "Basic Materials and Methods" for general piping materials and installation requirements.
 - 2. Division 15 Section "Valves" for general-duty gate, globe, ball, butterfly, and check valves.
 - 3. Division 15 Section "Thermometers and Gages" for thermometers, flow meters, and pressure and vacuum gages.
 - 4. Division 15 Section for labeling and identifying steam and condensate piping.
 - 5. Division 15 for pipe supports, product descriptions and installation requirements. Hanger and support spacing specified in this section.
 - 6. Division 15 "Automatic Temperature Controls" for temperature control, valves and sensors.

1.03 DEFINITIONS

- A. HP Systems: High-pressure systems operating at 15 psig (104 kPa) or more.
- B. LP Systems: Low-pressure systems operating at less than 15 psig (104 kPa).

1.04 SUBMITTALS

- A. Product Data: For each type of special-duty valve and steam trap indicated, including rated capacities and accessories.
- B. Shop Drawings: Detail flash tank assemblies and fabrication of pipe anchors, hangers, special pipe support assemblies, alignment guides, and expansion joints and loops and their attachment to the building structure. Include dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Failed test results and corrective action taken to achieve requirements.
- E. Maintenance Data: For steam traps, vacuum breakers, and meters, include in maintenance manuals as specified in Division 1.

1.05 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp flash tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

1.06 COORDINATION

- A. Coordinate layout and installation of steam and condensate piping and suspension system components with other construction, including light fixtures, hydronic piping, fire-suppression-system components, and partition assemblies.
- B. Coordinate pipe sleeve installation for foundation wall penetrations.
- C. Coordinate piping installation with roof curbs, equipment supports, and roof penetrations.
- D. Coordinate pipe fitting pressure classes with products specified in related Sections.
- E. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Sections.
- F. Coordinate installation of pipe sleeves for penetrations through exterior walls and floor assemblies. Coordinate with requirements for firestopping specified in Division 15 for fire and smoke wall and floor assemblies.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Safety Valves:
 - a. Armstrong International, Inc.
 - b. Kunkle Inds. Inc.; Kunkle Valve Division.
 - c. Spirax Sarco, Inc.
 - d. Watts Industries, Inc.; Watts Regulators.
 - 2. Pressure-Reducing Valves:
 - a. Armstrong International, Inc.
 - b. ITT Hoffman; ITT Fluid Technology Corp.
 - c. Leslie Controls, Inc.
 - d. Spence Engineering Company, Inc.
 - e. Spirax Sarco, Inc.
 - 3. Steam Traps:
 - a. Armstrong International, Inc.
 - b. Barnes & Jones, Inc.
 - c. Dunham-Bush, Inc.
 - d. ITT Hoffman; ITT Fluid Technology Corp.
 - e. Spirax Sarco, Inc.
 - f. Sterling, Inc.
 - 4. Air Vents and Vacuum Breakers:
 - a. Armstrong International, Inc.
 - b. Barnes & Jones, Inc.
 - c. ITT Hoffman; ITT Fluid Technology Corp.
 - d. Johnson Corp. (The).
 - e. Spirax Sarco, Inc.
 - 5. Steam Meters:
 - a. EMCO Flowmeters.
 - b. ISTECH Corp.
 - c. Preso Meters Corp.
 - d. Spirax Sarco, Inc.
 - 6. Condensate Meters:
 - a. Hersey Measurement Company.
 - b. ISTECH Corp.

2.02 PIPING MATERIALS

- A. General: Refer to Part 3 piping application articles for applications of pipe and fitting materials.

2.03 STEEL PIPE AND FITTINGS

- A. Steel Pipe:
1. Steel Pipe, NPS 2 (DN 50) and Smaller: ASTM A 53, Type S (seamless), Grade A, Schedules 40 and 80, black steel, plain ends.
 2. Steel Pipe, NPS 2-1/2 through NPS 12 (DN 65 through DN 300): ASTM A 53, Type E (electric-resistance welded), Grade A, Schedules 40 and 80, black steel, plain ends.
 3. Steel Pipe, NPS 14 through NPS 18 (DN 350 through DN 450): ASTM A 53, Type E (electric-resistance welded) or Type S (seamless), Grade B, Schedule 30, black steel, plain ends.
 4. Steel Pipe, NPS 20 (DN 500): ASTM A 53, Type E (electric-resistance welded) or Type S (seamless), Grade B, Schedule 20, black steel, plain ends.
 5. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedules 40 and 80, black steel; seamless for NPS 2 (DN 50) and smaller and electric-resistance welded for NPS 2-1/2 (DN 65) and larger.
- B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125, 150, and 300.
- C. Malleable-Iron Threaded Fittings: ASME B16.3; Classes 150 and 300.
- D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300.
- E. Cast-Iron Threaded Flanges and Flanged Fittings: ASME B16.1, Classes 125 and 250; raised ground face, and bolt holes spot faced.
- F. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
- G. Wrought-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
1. Material Group: 1.1.
 2. End Connections: Butt welding.
 3. Facings: Raised face.
 4. Flexible Connectors: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket; 150-psig (1035-kPa) minimum working pressure and 250 deg F (121 deg C) maximum operating temperature. Connectors shall have flanged or threaded-end connections to match equipment connected and shall be capable of 3/4-inch (20-mm) misalignment.

- H. Welding Materials: Comply with Section II, Part C, of the ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.
- I. Gasket Material: Thickness, material, and type suitable for fluid to be handled; and design temperatures and pressures.

2.04 VALVES

- A. Gate, globe, check, ball, and butterfly valves are specified in Division 15 Section "Valves."
- B. Refer to Part 3 "Valve Applications" Article for applications of each valve.

2.05 SAFETY VALVES

- A. Size and Capacity: As required for equipment according to the ASME Boiler and Pressure Vessel Code.
- B. Brass Safety Valves: Class 250, with threaded inlet and outlet; forged copper-alloy disc; fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.
 - 1. Drip-Pan Elbow: Cast iron and having threaded inlet and outlet with threads complying with ASME B1.20.1.
- C. Cast-Iron Safety Valves: Class 250; forged copper-alloy disc with bronze nozzle; fully enclosed, cadmium-plated steel spring with adjustable pressure range and positive shutoff; raised-face flanged inlet and threaded outlet connections; factory set and sealed.
 - 1. Drip-Pan Elbow: Cast iron and having threaded inlet and outlet with threads complying with ASME B1.20.1.
- D. Stop-Check Valves: Class 250, malleable-iron body and bonnet, cylindrical disc, removable liner and machined seat, brass-alloy stem, outside screw and yoke, polytetrafluoroethylene-impregnated packing with 2-piece packing gland assembly, flanged end connections, and cast-iron handwheel.

2.06 PRESSURE-REDUCING VALVES

- A. Size, Capacity, and Pressure Rating: Factory set for inlet and outlet pressures indicated.
 - 1. Valve Characteristics: Pilot-actuated, diaphragm type, with adjustable pressure range and positive shutoff. Valves shall have cast-iron body with threaded connections for valves NPS 2 (DN 50) and smaller and flanged connections for valves NPS 2-1/2 (DN 65) and larger; and

hardened stainless-steel trim, replaceable head and seat, main head stem guide fitted with flushing and pressure-arresting device, cover over pilot diaphragm, and non-asbestos gaskets.

2.07 STEAM TRAPS

- A. Thermostatic Traps: Class 125, bronze angle-pattern body with integral union tailpiece and screw-in cap; balanced-pressure, stainless-steel or monel bellow element; and renewable, hardened stainless-steel head and seat.
- B. Thermodynamic Traps: Stainless-steel body and screw-in cap; maximum operating pressure of 600 psig (4140 kPa); stainless-steel disc and seat; threaded ends.
 - 1. Float and Thermostatic Traps: ASTM A 126, cast-iron body and bolted cap; renewable, stainless-steel float mechanism with renewable, hardened stainless-steel head and seat; maximum operating pressure of 125 psig (860 kPa); balanced-pressure, stainless-steel or monel thermostatic bellow element.
 - 2. Thermostatic air vent capable of withstanding 45 deg F (25 deg C) of superheat and resisting water hammer without sustaining damage.
 - 3. Inverted Bucket Traps: Cast-iron body and cap, pressure rated for 250 psig (1725 kPa); stainless-steel head and seat; stainless-steel valve retainer, lever, and guide pin assembly; and brass or stainless-steel bucket.
 - 4. Strainer: Integral stainless-steel inlet strainer within the trap body.
 - 5. Air Vent: Stainless-steel thermostatic vent.

2.08 THERMOSTATIC AIR VENTS

- A. Quick Vents: Cast-iron or brass body, with balanced-pressure, stainless-steel or monel thermostatic bellows and stainless-steel heads and seats.
- B. Float Vents: Cast-iron or brass body, seamless brass float, balanced-pressure thermostatic bellows, and replaceable stainless-steel seat, float, and head.

2.09 VACUUM BREAKERS

- A. Vacuum Breakers: 150-psig (1035-kPa) steam working pressure, 365 deg F (185 deg C) maximum operating temperature, brass or stainless-steel body, and stainless-steel retainer, spring, and ball; with plain or threaded outlet.

2.10 STRAINERS

- A. Y-Pattern Strainers: 250-psig (1725-kPa) working steam pressure; ASTM A 126, Class B cast-iron body; stainless-steel screen, No. 20 mesh for NPS 2 (DN 50) and smaller and manufacturer's recommended perforations for NPS 2-1/2 (DN 65) and larger; tapped blowoff plug. Threaded connections for strainers NPS 2 (DN 50) and smaller and flanged connections for strainers NPS 2-1/2 (DN 65) and larger.
- B. Basket Strainers: 250-psig (1725-kPa) working steam pressure; ASTM A 126, Class B cast-iron body; stainless-steel screen; bolted cover; threaded connections for strainers NPS 2 (DN 50) and smaller and flanged connections for strainers NPS 2-1/2 (DN 65) and larger.

2.11 FLASH TANKS

- A. Shop or factory fabricated of welded steel according to the ASME Boiler and Pressure Vessel Code, for 150-psig (1035-kPa) rating; and bearing ASME label. Fabricate with tappings for vents, low-pressure steam and condensate outlets, high-pressure condensate inlet, air vent, safety valve, and legs.

2.12 METERS

- A. Steam Meters: Pipeline sensor of modified venturi design, of stainless-steel construction, for insertion in pipeline between flanges, plus or minus 1 percent accuracy over full-scale deflection, producing pressure differential proportional to square of flow rate.
- B. Steam Meters: Pipeline sensor with stainless-steel wetted parts and flange connections and with a piezoelectric sensor removable and serviceable without shutting down the process.
 - 1. Turndown Ratio: At least 10:1 with plus or minus 1 percent accuracy over full flow range.
 - 2. Microprocessor Enclosure: NEMA 250, Type 4.
- C. Steam Meters: Pipeline sensor of spring-loaded, variable-area flowmeter type; density compensated; plus or minus 2 percent accuracy over full-scale deflection. Meters shall have a flow computer to display totalizer flow, flow rate, temperature, pressure, time, and date; alarms for high and low flow rate and temperature; and independent timers to store four peak flow rates and total flow. Computer shall have four, 20-mA output, ETA 232C, serial communication ports.
 - 1. Condensate Meters: Brass body with threaded connections for meters NPS 2 (DN 50) and smaller and flanged connections for meters NPS 2-1/2 (DN 65) and larger; positive displacement turbine; magnetic coupling counter; suitable for temperatures up to 250 deg F (121 deg C) and for 250 psig (1725 kPa) working pressure.

PART 3 - EXECUTION

3.01 LP STEAM PIPING APPLICATIONS

- A. Steam Piping, NPS 2 (DN 50) and Smaller: Schedule 40 steel pipe, with threaded joints using Class 125 cast-iron fittings.
- B. Steam Piping, NPS 2-1/2 through NPS 12 (DN 65 through DN 300): Schedule 40 steel pipe, with welded joints using Schedule 40 wrought-steel welding fittings and Class 150 wrought-steel flanges.
- C. Steam Piping, NPS 14 through NPS 18 (DN 350 through DN 450): Schedule 30 steel pipe, with welded joints using Schedule 30 wrought-steel welding fittings and Class 150 wrought-steel flanges.
- D. Steam Piping, NPS 20 (DN 500): Schedule 20 steel pipe, with welded joints using Schedule 20 wrought-steel welding fittings and Class 150 wrought-steel flanges.
- E. Condensate Piping, NPS 2 (DN 50) and Smaller: Schedule 80 steel pipe, with threaded joints using Class 125 malleable-iron fittings.
- F. Condensate Piping, NPS 2-1/2 through NPS 12 (DN 65 through DN 300): Schedule 80 steel pipe, with welded joints using Schedule 80 wrought-steel welding fittings and Class 150 wrought-steel flanges.

3.02 HP STEAM PIPING APPLICATIONS

- A. Steam Piping, NPS 2 (DN 50) and Smaller: Schedule 40 steel pipe, with threaded joints using Class 300 malleable-iron fittings.
- B. Steam Piping, NPS 2-1/2 through NPS 12 (DN 65 through DN 300): Schedule 40 steel pipe, with welded joints using Schedule 40 wrought-steel welding fittings and Class 150 wrought-steel flanges.
- C. Steam Piping, NPS 14 through NPS 18 (DN 350 through DN 450): Schedule 30 steel pipe, with welded joints using Schedule 30 wrought-steel welding fittings and Class 150 wrought-steel flanges.
- D. Steam Piping NPS 20 (DN 500): Schedule 20 steel pipe, with welded joints using Schedule 20 wrought-steel welding fittings and Class 150 wrought-steel flanges.
- E. Condensate Piping, NPS 2 (DN 50) and Smaller: Schedule 80 steel pipe, with threaded joints using Class 300 malleable-iron fittings.

- F. Condensate Piping, NPS 2-1/2 through NPS 12 (DN 65 through DN 300): Schedule 80 steel pipe, with welded joints using Schedule 80 wrought-steel welding fittings and Class 150 wrought-steel flanges.

3.03 VALVE APPLICATIONS

- A. General-Duty Valve Applications: Unless otherwise indicated, use the following valve types:
1. Shutoff Duty: Gate and ball valves.
 2. Throttling Duty: Globe and ball valves.
- B. Install shutoff-duty valves at each branch connection to supply mains, at inlet connection to each steam trap, and elsewhere as indicated.

3.04 LP STEAM-TRAP APPLICATIONS

- A. Thermostatic Traps: Convectors and finned-tube radiation.
- B. Float and Thermostatic Traps: Steam main and riser drip legs, laundry equipment, kitchen equipment, heat exchangers, and heating coils.

3.05 HP STEAM-TRAP APPLICATIONS

- A. Thermostatic Traps: Convectors and finned-tube radiation.
- B. Inverted Bucket Traps: Steam main and riser drip legs, and laundry equipment.
- C. Float and Thermostatic Traps: Kitchen equipment, heat exchangers, and heating coils.
- D. Thermodynamic Traps: Steam main and riser drip legs, and heat tracer lines.

3.06 PIPING INSTALLATIONS

- A. Refer to Division 15 Section "Basic Materials and Methods" for basic piping installation requirements.
- B. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
1. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

- C. Install steam supply piping at a uniform grade of 0.2 percent downward in direction of steam flow.
- D. Install condensate return piping at a uniform grade of 0.4 percent downward in direction of condensate flow.
- E. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
 - 1. Unless otherwise indicated, install branch connections to steam mains using 45-degree fittings in main pipe, with the takeoff coming out the top of the main pipe. Use of 90-degree tee fittings is permissible if 45-degree fittings are impractical. If length of branch takeoff is less than 10 feet (3 m), pitch branch line down toward mains at a 0.4 percent grade.
 - 2. Install unions in piping NPS 2 (DN 50) and smaller adjacent to each valve, at final connections of each piece of equipment, and elsewhere as indicated.
 - 3. Install flanges in piping NPS 2-1/2 (DN 65) and larger at final connections of each piece of equipment and elsewhere as indicated.
 - 4. Install strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, traps, and elsewhere as indicated. Install NPS 3/4 (DN 20) nipple and ball valve in blowdown connection of strainers NPS 2 (DN 50) and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2 (DN 50).
 - 5. Anchor piping for proper direction of expansion and contraction.
 - 6. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of pressure regulators, control valves, isolation valves, pipe bends, and expansion joints.
 - 7. On straight runs with no natural drainage points, install drip legs at intervals not exceeding 300 feet (90 m) where pipe is pitched down in direction of steam flow and a maximum of 150 feet (45 m) where pipe is pitched up in direction of steam flow.
 - 8. Size drip legs at vertical risers same size as pipe and extend beyond rise. Size drip legs at other locations same diameter as main. In steam mains NPS 6 (DN 150) and larger, dirt leg size can be reduced, but to no less than NPS 4 (DN 100).
 - 9. Install gate valve at drip legs, dirt pockets, and strainer blowdowns to allow removal of dirt and scale.
 - 10. Install steam traps close to drip legs.

- F. Pitch condensate piping down toward flash tank. If more than one condensate pipe discharges into flash tank, install a swing check valve in each line. Install thermostatic air vent at top of tank. Install inverted bucket or float and thermostatic trap at low-pressure condensate outlet, sized for three times the condensate load. Install safety valve at tank top. Install pressure gage, gate valve, and swing check valve on low-pressure (flash) steam outlet.

3.07 STEAM-TRAP INSTALLATION

- A. Install steam traps in accessible locations as close as possible to connected equipment, but not more than 48 inches (1200 mm) from connected equipment.
- B. Unless otherwise indicated, install gate valve, strainer, and union upstream from trap; install union, check valve, and gate valve downstream from trap.

3.08 PRESSURE-REDUCING VALVE INSTALLATION

- A. Install pressure-reducing valves in readily accessible location for maintenance and inspection.
- B. Install bypass piping around each pressure-reducing valve, with globe valve equal in size to area of pressure-reducing valve seat ring, unless otherwise indicated.
- C. Install gate valves around each pressure-reducing valve.
- D. Install unions around each pressure-reducing valve having threaded-end connections.
- E. Install pressure gages on low-pressure side of each pressure-reducing valve and ahead of shutoff valve. Install pressure gages downstream from globe valve on pressure-reducing valve bypass.
 - 1. On two-stage pressure-reducing stations, install drip trap and pressure gage upstream from second stage pressure-reducing valve.
- F. Install strainers upstream for each pressure-reducing valve.
- G. Install safety valves downstream from each pressure-reducing valve station.

3.09 STEAM METER INSTALLATION

- A. Install lengths of straight pipe upstream and downstream from meters according to steam meter manufacturer's instructions.

3.10 SAFETY VALVE INSTALLATIONS

- A. Install safety valves according to ASME B31.1. Pipe safety valve discharge without valves to atmosphere outside building. Install drip-pan elbow fitting adjacent to safety valve and pipe drain connection to nearest floor drain.

3.11 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor devices are specified in Division 15.
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet (6 m) long.
 - 2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet (6 m) or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.
- C. Install hangers with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/4 (DN 20): Maximum span, 9 feet (2.7 m); minimum rod size, 1/4 inch (6.4 mm).
 - 2. NPS 1 (DN 25): Maximum span, 9 feet (2.7 m); minimum rod size, 1/4 inch (6.4 mm).
 - 3. NPS 1-1/2 (DN 40): Maximum span, 12 feet (3.7 m); minimum rod size, 3/8 inch (10 mm).
 - 4. NPS 2 (DN 50): Maximum span, 12 feet (4 m); minimum rod size, 3/8 inch (10 mm).
 - 5. NPS 2-1/2 (DN 65): Maximum span, 12 feet (4.3 m); minimum rod size, 3/8 inch (10 mm).
 - 6. NPS 3 (DN 80): Maximum span, 12 feet (4.6 m); minimum rod size, 3/8 inch (10 mm).
 - 7. NPS 4 (DN 100): Maximum span, 12 feet (5.2 m); minimum rod size, 1/2 inch (13 mm).
 - 8. NPS 6 (DN 150): Maximum span, 12 feet (6.4 m); minimum rod size, 1/2 inch (13 mm).
 - 9. NPS 8 (DN 200): Maximum span, 12 feet (7.3 m); minimum rod size, 5/8 inch (16 mm).
 - 10. NPS 10 (DN 250): Maximum span, 12 feet (8 m); minimum rod size, 3/4 inch (19 mm).

11. NPS 12 (DN 300): Maximum span, 12 feet (9.1 m); minimum rod size, 7/8 inch (22 mm).
 12. NPS 14 (DN 350): Maximum span, 12 feet (9.8 m); minimum rod size, 1 inch (25 mm)
 13. NPS 16 (DN 400): Maximum span, 12 feet (10.7 m); minimum rod size, 1 inch (25 mm).
 14. NPS 18 (DN 450): Maximum span, 12 feet (11.3 m); minimum rod size, 1-1/4 inches (32 mm).
 15. NPS 20 (DN 500): Maximum span, 12 feet (11.9 m); minimum rod size, 1-1/4 inches (32 mm).
- D. Support vertical runs at roof, at each floor, and at 10-foot (3-m) intervals between floors.

3.12 PIPE JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Materials and Methods" for joint construction requirements for threaded, welded, and flanged joints.

3.13 TERMINAL EQUIPMENT CONNECTIONS

- A. Size for supply and return piping connections shall be same as for equipment connections.
- B. Install traps and control valves in accessible locations close to connected equipment.
- C. Install bypass piping with globe valve around control valve. If multiple, parallel control valves are installed, only one bypass is required.
- D. Install vacuum breaker downstream from control valve and bypass and close to coil inlet connection.
- E. Install ports for pressure and temperature gages at coil inlet connections.
- F. Install a drip leg at coil outlet.

3.14 FIELD QUALITY CONTROL

- A. Prepare steam and condensate piping according to ASME B31.9 and as follows:
1. Leave joints, including welds, uninsulated and exposed for examination during test.
 2. Flush system with clean water. Clean strainers.

3. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
 4. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on steam and condensate piping:
1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 2. While filling system, use vents installed at high points of system to release trapped air. Use drip legs installed at low points for complete draining of liquid.
 3. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, "Building Services Piping."
 4. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
 5. Prepare written report of testing.

3.15 ADJUSTING

- A. Mark calibrated nameplates of pump discharge valves after steam and condensate system balancing has been completed, to permanently indicate final balanced position.
- B. Perform these adjustments before operating the system:
1. Open valves to fully open position. Close coil bypass valves.
 2. Set temperature controls so all coils are calling for full flow.
 3. Check operation of automatic bypass valves.

3.16 CLEANING

- A. Flush steam and condensate piping with clean water. Remove and clean or replace strainer screens.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15215 - VIBRATION ISOLATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work specified in this section.
- B. This section is a Division 15 Basic Materials and Methods section, and is a part of each Division 15 section making reference to vibration isolation products specified herein. Vibration isolation devices shall conform to the seismic requirements of section 1613 of the New York State Building Code. Isolators shall allow the amount of movement required by this code and shall be equipped with limit stops as required by this code.

1.02 DESCRIPTION OF WORK

- A. Extent of vibration isolation work required by this section is indicated on drawings and schedules, and/or specified in other Division 15 sections.
- B. Types of vibration isolation products specified in this section include the following:
 - 1. Fiberglass Pad and Shapes
 - 2. Neoprene Pads
 - 3. Cork/Neoprene Pads
 - 4. Equipment Rails
 - 5. Fabricated Equipment Bases
 - 6. Roof Curb Isolators
 - 7. Isolation Hangers
 - 8. Riser Isolators
 - 9. Riser Support Isolators
 - 10. Flexible Duct Connectors
 - 11. Flexible Pipe Connectors
- C. Vibration isolation products furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 15 sections.
- D. Refer to other sections of these specifications for equipment foundations, hangers, sealants, gaskets and other work related to vibration isolation work.

1.03 QUALITY ASSURANCE

- A. Product qualification - provide each type of vibration isolation unit produced by specialized manufacturer, with not less than 5 years successful experience in production of units similar to those required for project.
 - 1. Except as otherwise indicated, obtain support isolation

1.04 SUBMITTALS

- A. Product data - submit manufacturer's specifications, detailed drawings, performance characteristics data and installation instructions for each type of unit required.
 - 1. Include data for each type and size of unit, showing isolation efficiency, stiffness, natural frequency and transmissibility at lowest operating speed of equipment.
 - 2. Where required, include independent test agencies certified report of test results for each type of unit.
 - 3. For spring units, show wire size, spring diameter, free height, solid-compression height, operating height, fatigue characteristics and ratio of horizontal to vertical stiffness.
 - 4. For spring and pad type units, show basis of spring rate selection for range of loading weights.
 - 5. Include performance certifications where required.
- B. Shop drawings - submit shop drawings showing structural design and details of inertia bases, steel beam bases and other custom fabricated work not covered by manufacturer's submitted data.
 - 1. Furnish templates to fabricators of equipment bases, foundations and other support systems, as needed for coordination of vibration isolation units with other work.
- C. Submit shop drawings indicating scope of vibration isolation work and locations of units and flexible connections. Include support isolation points for piping and ductwork including risers, air housings and inertia bases.
 - 1. Include schedule of units, showing size or manufacturer's part number, and weight supported and resulting deflection of each unit.

PART 2 - PRODUCTS

2.01 ISOLATION MATERIALS AND SUPPORT UNITS

- A. Fiberglass pads and shapes - glass fiber of not more than 0.18 mil diameter, produced by multiple-flame attenuation process, molded with manufacturer's standard fillers and binders through 10 compression cycles at 3 times rated load bearing capacity, to achieve natural frequency of not more than 12 Hertz, in thicknesses and shapes required for use in vibration isolation units.
- B. Neoprene pads - oil resistant neoprene sheets, of manufacturer's standard hardness and cross ribbed pattern, designed for neoprene in shear type vibration isolation, and in thicknesses required.
- C. Cork/Neoprene pads - close grained composition cork sheet, laminated between 2 sheets of ribbed oil resistant neoprene, in thicknesses required.
- D. Vibration isolation products furnished as part of factory-fabricated equipment, are specified as part of the equipment assembly in other Division 15 sections.
- E. Refer to other sections of these specifications for equipment foundations, hangers, sealants, gaskets and other work related to vibration isolation work.

- F. Equipment rails - where rails or beams are indicated for use with isolator units to support equipment, provide steel beams complying with ANSI/ASTM A36, with minimum depth of 6" or $0.08 \times$ span of beam between isolators (whichever is greater). Provide welded bracket at each end of beams, and anchor each end to spring isolator unit. Provide bolt holes in beams matching anchor bolt holes in equipment. Provide beams of section modulus indicated or, if not indicated, selected for normal-weight equipment loading to limit static load stress to 16,000 psi.
1. Except as otherwise indicated, position equipment on equipment rails so that load will be equally supported by isolator units.
- G. Fabricated equipment bases - where supplementary bases are indicated for use with isolator units to support equipment (base not integral with equipment), provide welded unit, fabricated of structural steel shapes, plates and bars complying with ANSI/ASTM A36, as shown. Provide welded support brackets at points indicated, and anchor base to spring isolator units. Except as otherwise indicated, arrange brackets to result in the lowest possible mounting height for equipment. Provide bolt holes in base matching anchor bolt holes in equipment.
1. Where indicated, provide auxiliary steel base for support of motor, mounted on equipment base with slotted anchor bolt holes for adjustment of motor position.
 2. Where sizes of base framing members are not indicated, fabricate base with depth of structure not less than $0.10 \times$ longest span of base, rigidly braced to support equipment without deflections or distortions which would be detrimental to equipment or equipment performances.
- G. Roof-curb isolators - fabricated frame units sized to match roof curbs as shown, formed with isolation springs between extruded aluminum upper and lower sections, which are shaped and positioned to prevent metal-to-metal contact. Provide continuous airtight and waterproof seal between upper and lower extrusions. Include provisions for anchorage of frame unit to roof curb, and for anchorage of equipment to unit.
- H. Isolation hangers - hanger units formed with brackets and including manufacturer's standard compression isolators of type indicated. Design brackets for 5 times rated loading of units. Fabricate units to accept misalignment of suspension members, and for use with either rod or strap type members and including acoustical washers to prevent metal-to-metal contacts.
1. Provide vibration isolation spring with cap and pad type isolator, securely retained in unit.
 2. Provide neoprene pad, securely retained in unit.
 3. Provide fiberglass pad or shape, securely retained in unit, with threaded metal top plate.
 4. Provide removable spacer in each unit, to limit deflection during installation to rated-load deflection.
- I. Riser isolators - manufacturer's standard pad type isolator bonded to steel plate, formed for welding to pipe sleeve extension.

- J. Riser support isolators - manufacturer's standard pad type isolator laminated between two formed steel plate members, one for welding to pipe sleeve extension and other for welding to pipe riser.
- K. Flexible duct connectors - laminated flexible sheet of cotton duct and sheet elastomer (butyl, neoprene or vinyl), reinforced with steel wire mesh where required for strength to withstand duct pressure indicated. Form connectors with full faced flanges and accordion bellows to perform as flexible isolation unit, and of manufacturer's standard length for each size unless otherwise indicated. Equip each unit with galvanized steel retaining rings for airtight connection with ductwork.
- L. Flexible pipe connectors:
 - 1. For non-ferrous piping, provide bronze hose covered with bronze wire braid with copper tube ends or bronze flanged ends, brase-welded to hose.
 - 2. For ferrous piping, provide stainless steel hose covered with stainless steel wire braid with NPT steel nipples or 150 psi ANSI flanges, welded to hose.
 - 3. Rubber flexible pipe connectors - provide of rubber and butyl construction with integral full faced duck and butyl flanges, internally steel wire reinforced, and furnished complete with steel retaining rings. Select with temperature and pressure ratings to suit intended service.
 - 4. Manufacturer - subject to compliance with requirements, provide vibration isolation products of one of the following:
 - a. Korfund Dynamics Corp.
 - b. Mason Industries, Inc.
 - c. Vibration Eliminator Co., Inc.
 - d. Vibration Mountings and Controls, Inc.

PART 3 - EXECUTION

3.01 PERFORMANCE OF ISOLATORS

- A. General - comply with minimum static deflections recommended by the American Society of Heating, Refrigerating and Air Conditioning Engineers, including definitions of critical and noncritical locations, for selection and application of vibration isolation materials and units as indicated.
- B. Manufacturer's recommendations - except as otherwise indicated, comply with manufacturer's recommendations for selection and application of vibration isolation materials and units.

3.02 APPLICATIONS

- A. General - except as otherwise indicated, apply the following types of vibration isolators at indicated locations or for indicated items of equipment. Selection is Installer's option where more than one type is indicated.
- B. Neoprene pad type isolators - install where the following equipment is indicated:
 - 1. Floor mounted air handling units, in noncritical locations.

- C. Equipment rails and spring isolators - install where the following floor mounted equipment is indicated:
1. Air handling units, 7 1/2 H.P. and larger.
 2. Centrifugal fans, 7 1/2 H.P. and larger.
- D. Fabricated equipment base and spring isolators - install where the following equipment is indicated:
1. Centrifugal fans.
 2. Reciprocating refrigeration compressor, in noncritical locations.
- E. Roof curb isolators - install where the following equipment is located on roof curbs over critical locations:
1. Air handling units.
 2. Rooftop air conditioning units.
 3. Fan or blower units, of more than 1.5 H.P.
- F. Isolation hangers - install where the following suspended equipment is indicated:
1. Package air handling units.
 2. Pipe over 1" pipe size, located in mechanical equipment rooms and each run connected to vibration isolation mounted equipment for a distance of 100 diameters but not less than 50' - 0".
 3. Ductwork (except flexible ductwork), located in mechanical equipment rooms, and each run connected to vibration isolation mounted equipment for a distance of 50' - 0".
 4. Sound traps in ductwork.
 5. Ductwork, where air velocity is 3000 fpm or greater.
- G. Riser isolators - install where the following risers pass through floors and roofs, provide support type where riser support is required:
1. Pipe risers.
 2. Pipe risers, within 50' - 0" of connection with vibration isolation mounted equipment.
 3. Pipe risers, in critical locations.
 4. Pipe risers, 2" pipe size and larger, in critical locations.
 5. Ductwork risers, in critical locations.
 6. Ductwork risers, where air velocity is 3000 fpm or greater.
 7. Ductwork risers, within 50' - 0" of connection with vibration isolation mounted equipment.
- H. Flexible duct connectors - install at the following ductwork connections:
1. Connections with vibration isolation mounted air handling equipment.
 2. Connections with fixed wall louvers for air intake and exhausts.
 3. Where ductwork, 1.0 square foot and greater, changes directions in critical locations.
- I. Flexible pipe connectors - install in piping systems at the following location:
1. Connections, 3/4" pipe size and larger, with vibration isolation mounted equipment.

3.03 INSTALLATION

- A. General - except as otherwise indicated, comply with manufacturer's instructions for installation and load application to vibration isolation materials and units. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short circuited by other contacts or bearing points. Remove space blocks and similar devices (if any) intended for temporary protection against overloading during installation.
- B. Anchor and attach units to substrate and equipment as required for secure operation and to prevent displacement by normal forces, and as indicated.
- C. Adjust leveling devices as required to distribute loading uniformly onto isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.
- D. Locate isolation hangers as near overhead support structure as possible.
- E. Weld riser isolator units in place as required to prevent displacement from loading and operations.
- F. Bond flanges of flexible duct connectors to ducts and housings to provide airtight connections. Seal seams and penetrations to prevent air leakage.
- G. Flexible pipe connectors - install on equipment side of shutoff valves, horizontally and parallel to equipment shafts wherever possible.

3.04 DEFLECTION MEASUREMENTS

- A. Upon completion of vibration isolation work, prepare report showing measured equipment deflections for each major item of equipment as indicated.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15250 - MECHANICAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Extent of mechanical insulation work required by this section is indicated on Drawings and by requirements of this section.
- B. Types of insulation and accessories specified in this section include the following:
 - 1. Type P-1, Sectional molded glass fiber pipe insulation.
 - 2. Type P-2, Sectional rigid foam glass pipe insulation.
 - 3. Type P-3, Flexible elastomeric cellular pipe insulation.
 - 3. Type P-5, Aluminum jacketing for piping
 - 4. Type P-6, Hydrophobic 'pourable' underground pipe insulation
 - 5. Type D-2, Flexible glass fiber blanket-aluminum foil facing.
 - 6. Type D-4, Aluminum jacketing for ductwork.

1.02 QUALITY ASSURANCE

- A. Fire Hazard Classification: In accordance with ASTM E-84.
- B. NFPA 255 and UL 723, for insulation systems, including insulation, adhesives and coverings, not to exceed the following:
 - 1. Flame spread 25.
 - 2. Fuel contributed 50.
 - 3. Smoke developed 50.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturers specification sheets, installation instructions, fire and smoke ratings. Submit schedule matching insulation type to mechanical systems and equipment.

PART 2 - PRODUCTS

2.01 INSULATION - TYPE P1

- A. Sectional Molded Glass Fiber Pipe Insulation: Minimum density 4.5 pounds per cubic foot. Factory applied jacket consists of white, flame retardant jacket of .001 inch minimum aluminum foil, laminated to glass fiber reinforced kraft paper with a flame retardant snuffer type adhesive. Jacket has minimum 1-1/2 inch longitudinal sealing lap. Minimum circumferential sealing strips, 3 inches wide.
- B. Fittings Valves and Flanges: Molded, precut, or segmental insulation equal in thickness to adjoining pipe insulation. Alternate, hydraulic-setting insulating cement. Surface finish pre-molded PVC fitting cover system. Alternate: fitting mastic, fiberglass, reinforcing strips and top coat of fitting mastic.

C. Manufacturers:

1. Certain Teed
2. Knauf Fiberglass
3. Schuler
4. Owens-Corning
5. U.S.G.

2.02 INSULATION - TYPE P2

- A. Sectional, Rigid, Foamed Glass Pipe Insulation: Minimum density 8.5 pounds per cubic foot.
- B. Fittings, Valves, and Flanges: Molded or segmental foamed glass insulation equal in thickness to adjoining pipe insulation.
- C. Exposed and Concealed Pipe: If exposed to weather, finish additionally with .016 inch embossed aluminum jacket, secured with 3/4 inch by .015 inch aluminum strappings and seals.
- D. Fittings, Valves, and Flanges: Insulate with preformed or mitered segments of foamed glass, wired, or taped in place and finished with 2 coats of vinyl fitting mastic with glass fabric reinforcement between coats.
- E. Manufacturer: Pittsburgh Corning Corp.

2.03 INSULATION TYPE P-3

- A. Black flexible closed cell foamed elastomeric pipe insulation with inner and outer surface skin, extruded tubing. Water permeability .17 to .28 perm-inch; water absorption 3 to 10 percent.
- B. Manufacturers:
 1. Armstrong
 2. Rubatex Corp.

2.04 ALUMINUM JACKETING FOR PIPING - TYPE P5

- A. Jacketing: Aluminum roll, Type 3003, 0.016 inch thick, 36 inches wide with moisture barrier for cold applications, without moisture barrier for hot applications.
- B. Fittings: Aluminum, preformed for tees, valves, 90 degree and 45 degree elbows: Childers ELL JAC or Premetco International.

2.05 HYDROPHOBIC 'POURABLE' FOR UNDERGROUND PIPING - TYPE P6

- A. Pourable: 100% Calcium Carbonate approximately 60-62 lbs/ sq ft bulk density with 4-6 mil thick polyethylene top vapor barrier.
- B. Manufacturer:
 1. Dritherm International, Inc.

2.06 INSULATION - TYPE D2

- A. Flexible glass fiber duct blanket. Minimum density: 1 pound per cubic foot.
- B. Facing: Aluminum foil, minimum .001 inches thick, reinforced with glass fiber yarn mesh and laminated to 40 pound permanently treated, fire-resistant kraft.
- C. Manufacturers:
 - 1. Certain Teed
 - 2. Knauf Fiberglass
 - 3. Schuller
 - 4. Owens-Corning
 - 5. U.S.G.

2.07 ALUMINUM JACKETING FOR DUCTWORK D-4

- A. Jacketing: Aluminum preformed, Type 3003, 0.016 inch thick rolls with moisture barrier for cold applications, without moisture barrier for hot applications. [Childers] [Premetco International].
- B. Stainless Steel Strip: AISI Type 301, 0.015 inches thick, 1/2 inch wide, No. 5 edge, annealed, embossed with "NON-ASBESTOS".
- C. Strapping Seals: AISI Type 302, stainless steel, 1/2 inch wide. Interlaken 44.
- D. Adhesive: Silicone rubber sealant. General Electric RTV. Dow Corning. Polymer One Sealant.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Apply insulation in accordance with the Schedule of Insulation at the end of this Section.
- B. Use only insulation and finish materials including adhesives, cements, and mastics which conform to the requirements of all local codes and ordinances.
- C. Fire resistant adhesive is highly flammable in liquid form. Eliminate welding, smoking, or other sources of ignition during application.
- D. Apply insulation after all piping pressure tests, as described in Piping Installation Procedure, have been completed.
- E. Clean surfaces of loose scale, dirt, oil, and other foreign matter and dry prior to insulating.
- F. Apply insulation to completely cover piping surface. Do not insulate over weld certification stamps.
- G. "Exposed" as used in this section means exposed to view. "Concealed" means concealed to view such as in furred chases or

above suspended ceiling. Penthouse and equipment rooms are considered exposed locations.

- H. Fill surface imperfections in the insulation such as chipped edges, small joints or cracks, and small voids or holes with appropriate insulation material and smooth with skim coat of hydraulic-setting insulating cement. Vapor barriers shall be continuous and unbroken at hanger installations.
- I. Fit inside diameter of insulation sections or segments to outside curvature of pipe or previous insulation layer.
- J. Where standard insulation shapes are not available, cut, score, or miter segments of appropriate block to fit contour of pipe. Stagger joints of adjoining segments. Fit insulation carefully and secure with No. 20 gage galvanized annealed steel wire. Finish with a smoothing coat of hydraulic-setting insulating cement.
- K. Insulate valves, strainer, fittings, and flanges with identical material, density, thickness, and surface finish as the piping insulation. All edges shall be filled with filler and finished with a smoothing coat of hydraulic-setting insulating cement.
- L. Insulate the entire surface of fittings and strainers. Insulate valves up to and including bonnets, unless authorized otherwise by Project Engineer. Do not cover removable valve bonnets.
- M. Insulate strainers to permit removal of the basket without disturbing the insulation of the strainer body. Strainer covers shall be molded and taped to upper section of insulation.
- N. Bevel the ends of pipe insulation adjacent to flanges to permit bolt removal. Provide a collar of sectional block insulation over the flanges and extend a minimum of 2 inches over the adjacent pipe insulation. Fasten with staples to permit easy removal. Prior to applying collar fill annular spaces with loose insulation.
- O. Insulate all piping through sleeves.
- P. Where pipelines pass through masonry walls or floors, completely fill the space between outside of pipe or insulation and the inside of the sleeve or framed opening with fibrous mineral wool or fiberglass pipe insulation.
- Q. When it is unavoidable and hangers for cold lines must be installed directly on the pipe, insulate and finish the entire hanger and the rod for a length of not less than 12 inches above the pipe.
- R. For hot lines supported on rollers, provide pipe covering protection saddles and fill the hollow interior of saddles with insulating cement or fibrous glass.
- S. Insulate Dresser-type couplings and other gasketed joints in refrigerant systems in a manner to allow removal of insulation, without damage, for repair and leak-checking of couplings and gasketed joints.
- T. Apply insulation to completely cover metal surfaces.

- U. Cut, score, or miter insulation to fit shape and contour of ductwork and equipment. Where surfaces are flat, cylindrical, or regularly curved, use premolded blocks or segments.
- V. Where required, provide permanently fastened angles or plates to support insulation.
- W. Apply insulation on cover plates, heads and access openings as separate sections, with insulation cut back for access to boltheads and other fasteners.
- X. Do not insulate over nameplates. Cut back insulation and line the insulation edges with 24 gage galvanized steel.
- Y. Surface Finish.
 - 1. Apply surface finish to present a tight, smooth appearance.
 - 2. Do not apply sealant or cement until all previous applications of cement and adhesives have thoroughly dried.
 - 3. Extend surface finish to protect all insulation surfaces. Prevent raw edges or ends of insulation from being exposed.

3.02 APPLICATION OF TYPE P1 INSULATION

- A. Exposed and Concealed Pipe: Staple longitudinal lap unless factory pre-sealed laps are supplied or adhesive is used, with 9/16 inch coated staples, 2 inches on center, butt adjoining sections firmly together. Apply butt-joint strips, making sure coated or dull side is out. Center the strip for a snug fit and fasten with 2 staples, one each approximately 1/2 inch from each edge.
- B. Exposed and Concealed Fittings, Valves, Flanges: Insulate with molded, pre-cut or segmental insulation equal in thickness to adjoining pipe insulation. Alternate: Hydraulic-setting insulating cement same thickness as adjoining insulation. Alternate: Pre-molded PVC fitting cover system.
- C. Surface Finish (Indoor)
 - 1. Exposed and Concealed Pipe: No additional finish required.
 - 2. Exposed and Concealed Fittings, Valves, Flanges: Apply a skim coat of insulating cement to produce a smooth surface. After cement is dry, apply a light coat of fitting mastic. While mastic is still wet, wrap the fitting with fiberglass reinforcing cloth strips overlapping the preceding layer by 1 to 2 inches and adjoining pipe by 2 inches, and embedding the cloth into the mastic. When dry, apply a second coat of mastic over the entire fitting to a minimum wet thickness of 3/64 inch. Alternate: Apply one piece pre-molded PVC fitting covers with galvanized coated tack fasteners.

Tape circumferential joint between insulation and premolded fitting cover with 2 inch pressure sensitive polyvinyl tape.
 Note: Wipe all joints clean before applying tape.
 Alternate: Apply 8 ounce canvas between 2 coats of lagging cement.

3.03 APPLICATION OF TYPE P2 INSULATION

- A. Exposed and Concealed Pipe: Seal lap of vapor barrier jacket with fire-resistant adhesive. Staple longitudinal lap with three 9/16 inch coated staples, applying lagging cement over staples. Adjoining sections of pipe insulation are to be butted tightly together and the vapor barrier continued by sealing the circumferential joint with butt joint strips adhered with fire-resistant adhesive.
- B. Exposed and Concealed Fittings, Valves, Flanges: Insulate with molded or segmental foamed glass insulation equal in thickness to adjoining pipe insulation and secured with No. 20 gage galvanized annealed steel wire.
- C. Surface Finish (Indoor)
 - 1. Exposed and Concealed Pipe: No additional finish required.

3.04 APPLICATION OF TYPE P3 INSULATION

- A. Slit insulation lengthwise. Coat longitudinal seams and joints with adhesive and install it on pipe. Miter insulation at elbows and glue.
- B. Fully cover seams and butt joints with adhesive to assure a complete seal to maintain insulation efficiency and vapor barrier.
- C. Do not stretch insulation to obtain longer lengths.
- D. Unless otherwise specified, completely insulate common applications (such as hose stations, drinking fountains, etc.) for chilled and hot water.
- E. On cold applications, insulate valves, unions, and pipe installed with direct contact clamp hangers, butt insulation to hanger both sides and install oversized materials over hanger. Lap 1 to 2 inches minimum onto the smaller sized material.
- F. On cold applications wrap all gages, petcocks, etc. with Cork Insulation Tape.

3.05 APPLICATION OF TYPE P5 INSULATION

- A. Provide a 1/2 inch to 3/4 inch safety edge on all exposed longitudinal seams (except corrugated aluminum jacketing).
- B. Longitudinal lap to be a minimum of 2 inches, located on horizontal centerline. Overlap butt joints a minimum of 3 inches.
- C. Install 1/2 inch wide stainless steel strips located on the edge of butt joint, and then on 12 inch centers thereafter. Use two strapping seals. The first to keep the strap tight and the second to cover and secure the cut end of the strap.
- D. Use aluminum butt straps where jacket cannot be overlapped (gored fittings and flanges). Use 1/2 inch wide stainless steel strips to hold butt straps.

- E. Seal seams, joints or openings in the jacket that cannot be sealed by overlapping the aluminum jacket or by butt straps with silicone rubber.
- F. Jacket both 45 degree and 90 degree elbows through 10 inches with preformed aluminum jackets. For fittings 12 inches and larger, use mitred fittings.
- G. Jacket other fittings or valves with sheet aluminum fabricated as necessary. Use aluminum jacketing only for end caps.
- H. Install "S" clips on vertical piping to hold jacket in place.
- I. Lap Directions, Horizontal Lines: Circumferential laps on exterior jacketing shall face east or south. Longitudinal laps shall face down (upper and lower) located on horizontal center line.
- J. Lap Directions, Vertical Lines: Interior or exterior jackets shall be overlapped shingle style (upper over lower). Exterior longitudinal laps shall face east or south.

3.06 APPLICATION OF TYPE P6 INSULATION

- A. GENERAL: Install hydrophobic pourable underground piping insulation in strict compliance with manufacturers installation guidelines and specifications. Provide and install all manufactures required forms, spacers, pipe supports, etc including polyfilm top vapor barrier and minimum 1'-6" backfill. (note: minimum depth of pipe to be 3'-0")

3.07 APPLICATION OF TYPE D4 INSULATION

- A. For round duct, fasten aluminum jacket in place with stainless steel strips. For rectangular duct, apply strips (corner beads) and sheet material secured with screws or pop rivets. Ducts greater than 24 inches shall have cross breaks.
- B. Jacketing sequence shall be bottom, sides, then top.
- C. Overlap seams a minimum of 2 inches.
- D. After bands are secure, use stainless steel or aluminum screws or pop-rivets on seams where necessary.
- E. Apply jacket shingle style on risers (upper jacket over lower) to provide drainage. Use stainless steel strip to secure jacketing.
- F. Seal breaks and seams in aluminum jacket with silicone rubber sealant.

3.08 SCHEDULE OF PIPING INSULATION

<u>Service</u>	<u>Size</u>	<u>Type</u>	<u>Thickness</u>
Heating Hot Water	Thru 1-1/4"	P1	1-1/2"
Heating Hot Water	1-1/2" & over	P1	2"
Steam	Thru 3"	P1	2-1/2"
Steam	4" & over	P1	3"
Steam condensate	Thru 1-1/4"	P1	1-1/2"
Steam condensate	1-1/2" & over	P1	2"
Air Handling Unit Drain			
Line (Condensate)	All	P1	1/2" (a)
Refrigerant (piping)	Thru 2"	P2	1"
Refrigerant (piping)	Over 2"	P2	2"
Pipe Supports (b)	All	P3	Varies (b)
Chilled Water	Thru 6"	P1	2" *

(*underground piping 'pourable' insulation minimum thickness=6"all around top/bottom/sides of pipe)

- a. All insulation thickness services shall be 1 inch thickness when applied outdoors-above ground. (Consider heating cables).
- b. Refer to D1.2.0, Insulation Protection at Pipe Support.

3.09 SCHEDULES OF DUCT INSULATION

<u>Insulation Service</u>	<u>Type</u>	<u>Thickness</u>
Concealed/Exposed Supply Ducts, etc (Refer to section 15290)	D2	2"

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15290 - DUCT INSULATION - INTERIOR

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and provisions of contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.02 SUMMARY

- A. This section includes duct and plenum insulation.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 15 Section "Ductwork" for duct lining.

1.03 DEFINITIONS

- A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.
- B. Dual-Temperature Surfaces: Normal Operating temperatures that vary from hot to cold.
- C. Cold Surfaces: Normal operating temperatures less than 75 deg F.
- D. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.
- E. Density: Is expressed in lb/cu. ft.

1.04 SUBMITTALS

- A. General: Submit the following in accordance with General Conditions of the Contract and Division 1 specification sections.
- B. Product and data for each type of duct insulation identifying k-value, thickness, and accessories.
- C. Material certificates, signed by the manufacturer, certifying that materials comply with specified requirements where laboratory test reports cannot be obtained.
- D. Material test reports prepared by a qualified independent testing laboratory. Certify insulation meets specified requirements.

1.05 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.
 - 1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.

1.06 SEQUENCING AND SCHEDULING

- A. Schedule insulation application after testing of duct systems.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering 'GREENGUARD' certified products that may be incorporated in the Work include, but are not limited to the following:
 - 1. Glass Fiber:
 - a. CertainTeed Corporation.
 - b. Knauf Fiberglass GmbH.
 - c. Manville.

2.02 GLASS FIBER

- A. Material: Inorganic glass fibers, bonded with a thermosetting resin.
- B. Jacket: All-purpose, factory-applied, laminated glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil having self-sealing lap.
- C. Board: ASTM C 612, Class 2, semi-rigid jacketed board.
 - 1. Thermal Conductivity: 0.23 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.
 - 2. Density: 3 pcf average maximum.
- D. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets. (maximum 25% compression installed)
 - 1. Thermal Conductivity: 0.23 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.

- E. Adhesive: Produced under the UL Classification and follow-up service.
 - 1. Type: Non-flammable, water-based.
 - 2. Service Temperature Range: Minus 20 to 180 deg F (Minus 29 to 82 deg C).
- F. Vapor Barrier Coating: Waterproof coating recommended by insulation manufacturer for outside service.

2.03 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Woven glass fiber fabrics, plain weave, pre-sized a minimum of 8 ounces per sq. yd.
 - 1. Tape Width: 4 inches
 - 2. Cloth Standard: MIL-C-20079H, Type I.
 - 3. Tape Standard: MIL-C-20079H, Type II.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
 - 1. Stainless Steel: Type 304, 0.020 inch thick.
 - 2. Aluminum: 0.0070 inch thick.
- C. Wire: 14-gauge nickel copper alloy, 16-gauge, soft-annealed stainless steel, or 16-gauge, soft annealed galvanized steel.
- D. Corner Angles: 28-gauge (0.3 mm), 1 inch by 1 inch (25 mm by 25 mm) aluminum, adhered to 2 inches by 2 inches (51 mm by 51 mm) kraft paper.
- E. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.04 SEALING COMPOUNDS

- A. Vapor Barrier Compound: Water-based, fire-resistive composition.
 - 1. Water Vapor Permeance: 0.08 perm maximum.
 - 2. Temperature Range: Minus 20 to 180 deg F.
- B. Weatherproof Sealant: Flexible-elastomer-based, vapor-barrier sealant designed to seal metal joints.
 - 1. Water Vapor Permeance: 0.02 perm maximum.
 - 2. Temperature Range: Minus 50 to 250 deg F.
 - 3. Cooler: Aluminum.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Surface Preparation: Clean, dry and remove foreign materials such as rust, scale, and dirt.

3.02 INSTALLATION

- A. Refer to schedules at the end of this section for materials, forms, jackets, and thicknesses required for each duct system.
- B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.
- C. Install vapor barriers on insulated ducts and plenums having surface operating temperatures below 60 deg.
- D. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.
- E. Install insulation with smooth, straight, and even surfaces.
- F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.
- G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.
- H. Seal Ends: Except for flexible elastomeric insulation, taper ends at 45 degree angle and seal with lagging adhesive. Cut ends of flexible elastomeric cellular insulation square and seal with adhesive.
- I. Apply water based adhesives and coatings at the manufacturer's recommended coverage-per-gallon rate.
- J. Keep insulation materials dry during application and finishing.
- K. Install board insulation as follows:
 - 1. Adhesive and Band Attachment: Secure board insulation tight and smooth with at least 50 percent coverage of water based adhesive. Install bands spaced 12 inches apart. Protect insulation under bands and at exterior corners with metal corner angles. Fill joints, seams, and chipped edges with vapor barrier compound.
 - 2. Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 18 inches apart each way and 3 inches from insulation joints. Apply vapor barrier coating compound to insulation in contact, open joints, breaks, punctures, and voids in insulation.
- L. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:
 - 1. Smaller Than 24 Inches: Bonding water based adhesive applied in 6-inch (150-mm) wide transverse strips on 12-inch centers.

2. 24 inches and Larger: Anchor pins spaced 12 inches (300 mm) apart each way. Apply bonding adhesive to prevent sagging of the insulation.
3. Overlap joints 3 inches.
4. Seal joints, breaks, and punctures with vapor barrier compound.

3.03 JACKETS

- A. Foil and Paper Jackets (FP): Install jackets drawn tight. Install lap or butt strips at joints with material same as jacket. Secure with adhesive. Install jackets with 1-1/2 inches (40 mm) laps at longitudinal joints and 3 inches (75 mm) wide butt strips at end joints.

1. Seal openings, punctures, and breaks in vapor barrier jackets, and exposed insulation with vapor barrier compound.

3.04 APPLICATIONS

- A. General: Materials and thicknesses are specified in schedules at the end of this Section.
- B. Duct Systems: Insulate all new interior ductwork.

3.05 DUCT SYSTEMS INSULATION SCHEDULE

- A. All interior supply and return ducts:

Material	Type	Installed R-value	Vapor Barrier Req'd	Field- Applied Jacket
Glass Fiber	Blanket	6.0	Yes	None

- B. All outdoor air intake ducts and outdoor air plenums:

Material	Type	Installed R-value	Vapor Barrier Req'd	Field- Applied Jacket
Glass Fiber	Blanket	8.0	Yes	None

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15291 - DUCT INSULATION - EXTERIOR

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and provisions of contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.02 SUMMARY

- A. This section includes exterior supply and return ductwork and plenum insulation.

1.03 DEFINITIONS

- A. Hot Surfaces: Normal operating temperatures of 100 deg F or higher.
- B. Dual-Temperature Surfaces: Normal Operating temperatures that vary from hot to cold.
- C. Cold Surfaces: Normal operating temperatures less than 75 deg F.
- D. Thermal Conductivity (k-value): Measure of heat flow through a material at a given temperature difference; conductivity is expressed in units of Btu x inch/h x sq. ft. x deg F.
- E. Density: Is expressed in lb/cu. ft.

1.04 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 specification sections.
- B. Product and data for each type of duct insulation identifying k-value, thickness, and accessories.
- C. Samples of each type of insulation. Identify each sample describing product and intended use. Submit 12 inches square sections of each sample materials.
- D. Material certificates, signed by the manufacturer, certifying that materials comply with specified requirements where laboratory test reports cannot be obtained.
- E. Material test reports prepared by a qualified independent testing laboratory. Certify insulation meets specified requirements.

1.05 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.
 - 1. Exterior Insulation: Flame spread value of 25 or less and a smoke developed value of 50 or less.

1.06 SEQUENCING AND SCHEDULING

- A. Schedule insulation application after cleaning and sealing of the new ductwork and testing of duct systems sealing; ductwork to be air and water tight to prevent tempered air exfiltration and water infiltration to SMACNA seal class 'A'.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering 'GREENGUARD'/'ENERGY-STAR' certified products that may be incorporated in the Work include, but are not limited to the following:
 - 1. Rigid Foam Insulation:
 - a. Owens Corning - Foamular 250.
 - b. Dow - Styrofoam Highload 40.
 - c. GreenGuard Type VI.
 - 2. Protective Membrane:
 - a. MFM Building Products Corp.-FlexClad 250 - 36"-52836 25mils
 - b. Polyguard Products-Alumaguard / Alumaguard All Weather

2.02 RIGID FOAM - based on Owens Corning 'Foamular 250'

- A. Material: Extruded closed cell polystyrene (XPS).
- B. Board: ASTM C 578, Type IV, rigid board.
 - 1. Thermal Conductivity: 0.20 Btu x inch/h x sq. ft. x deg F average maximum at 75 deg F mean temperature.
 - 2. Thermal Resistance(R):5.0 per inch at 75 deg F mean temperature.
- C. Adhesive: Produced under the UL Classification.
 - 1. Type: Non-flammable, water-based.
 - 2. Application Temperature Range: 40°F to 90°F.

2.04 PROTECTIVE MEMBRANE - based on MFM - FlexClad 250 - 36"-52836 25mils

- A. Material: Outer layer - embossed UV-resistant white weathering surface, multiple layers of high-density cross linked polyethylene and rubberized asphalt adhesive layer. Total thickness = 25 mils.
- B. Flame Spread: 0 (ASTM E 84-97a)
- C. Smoke Density: 5 (ASTM E 84-97a)
- D. Vapor Permeance = 0.01 perms (E-96-95)
- E. Adhesive = Modified Asphalt

2.04 ACCESSORIES AND ATTACHMENTS

- A. Membrane Tape: (based on MFM 'Peel & Seal')
 - 1. Tape Width: minimum 4 inches white finish
 - 2. Vapor Permeance: <0.01 (ASTM E96)
 - 3. Thickness: 25 mil minimum.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
 - 1. Stainless Steel: Type 304, 0.020 inch thick.
 - 2. Aluminum: 0.0070 inch thick.
- C. Wire: 14-gauge nickel copper alloy, 16-gauge, soft-annealed stainless steel, or 16-gauge, soft annealed galvanized steel.
- D. Edge/Corner/Close-off Angles: 28-gauge, 1 inch by 1 inch aluminum, adhered with membrane tape.
- E. Anchor Pins (**for primary insulation attachment and for protective membrane covering on ductwork 24" wide and greater**): Welded copper-coated steel pin for capacitor-discharge welding with a minimum 1 1/2" diameter galvanized speed washer capable of supporting/holding 100 pounds for direct pull perpendicular to the attached surface. Provide anchor pins and speed washers of sizes and diameters as may be otherwise recommended by the manufacturer for insulation type and thickness.
- F. Spray Adhesives: based on MFM Spray Adhesive for protective membrane and Ductmate Protack/HV for insulation.

2.04 DUCT SEALING COMPOUNDS

- A. Duct Sealant Compound: (based on 'Ductmate' Everseal) Water-based, non-flammable composition.
 - 1. Water Resistant, No VOC's and UV Resistant.
 - 2. Service Temperature Range: Minus 25 to 200 deg F.
- B. Weatherproof Sealant: Flexible synthetic latex based, vapor/air barrier sealant designed to seal metal joints and seams.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Surface Preparation: Clean, dry and remove foreign materials such as rust, scale, and dirt including existing mastic coating on existing ductwork, existing fiberglass insulation, existing anchor pins, etc. Apply duct sealant compound to **all** joints and seams including all anchor pin holes, access plates, etc. (Reference SMACNA seal class 'A').

3.02 INSTALLATION

- A. Refer to schedules at the end of this section for materials, forms, jackets, and thicknesses required for each duct system.
- B. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state; follow manufacturer's installation guidelines.
- C. Install vapor barriers on insulated ducts and plenums having surface operating temperatures below 60 deg.
- D. Apply insulation material, accessories, protective membrane and finishes according to the manufacturer's printed instructions.
- E. Install insulation with smooth, straight, and even surfaces.
NOTE: after top of duct insulation is installed, additional top of duct insulation is to be installed and pitched at a minimum of 1/4" per foot to prevent puddling on the top of the ductwork.
- F. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier (i.e. exterior ductwork).
- G. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier.
- H. Seal Ends: Taper ends at 45 degree angle and seal with membrane tape and or spray adhesive.
- I. Apply water based adhesives and coatings at the manufacturer's recommended coverage-per-gallon rate.
- J. Keep insulation materials dry during application and finishing.
- K. Install rigid foam board insulation as follows:
 - 1. Adhesive and Band Attachment: Secure board insulation tight and smooth with at least 50 percent coverage of water based adhesive. Install bands, where required, spaced 12 inches apart. Protect insulation under bands and at exterior corners and edges with metal corner angles. Cover joints, seams, gaps and chipped edges with membrane tape.
 - 2. Speed Washers Attachment: Secure insulation tight and smooth with speed washers and welded pins. Space anchor pins 12 inches apart each way and 3 inches from insulation

joints. Apply membrane tape to insulation in contact, open joints, breaks, punctures, and voids in insulation.

3. Apply protective membrane strickly adhering to the manufacturers installation instructions including 'pinning' on ductwork 24" wide and greater.

3.03 APPLICATIONS

- A. General: Materials and thicknesses are specified in schedules at the end of this Section.
- B. Duct Systems: Unless otherwise indicated, insulate the following duct systems:
 1. Exterior exposed supply and return ductwork.

3.06 DUCT SYSTEMS INSULATION SCHEDULE

EXTERIOR EXPOSED HVAC SUPPLY/RETURN DUCTS AND PLENUMS

MATERIAL	FORM	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	FIELD- APPLIED JACKET/ MEMBRANE
RIGID FOAM	BOARD	2	YES (JOINTS AND SEAMS)	YES

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15510 - HOT/CHILLED WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Extent of hot and / or chilled water piping systems work is indicated on drawings and schedules, and by requirements of this section.
- B. Applications for hot/chilled water piping systems include the following:
 - 1. Hot/chilled water piping systems for hot/chilled water heating/cooling terminal units.
 - 2. Hot/chilled water piping systems for hot/chilled water coils in air handling units.
- C. Refer to appropriate Division 15 sections for insulation required in connection with hot/chilled water piping systems.

1.03 QUALITY ASSURANCE

- A. ANSI Compliance: Comply with applicable American National Standards pertaining to products and installation of hot/chilled water piping systems.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's data for hot/chilled water piping systems, materials and products.
- B. Shop Drawings: Submit scaled layout drawings of installed hot/chilled water pipe and fittings including, but not necessarily limited to, pipe sizes, locations, elevations and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between piping and proximate equipment.

PART 2 - PRODUCTS

2.01 HOT/CHILLED WATER PIPING MATERIALS AND PRODUCTS

- A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings and capacities as indicated. Where not indicated, provide proper

selection as determined by engineer to comply with installation requirements.

- B. Provide materials and products complying with ANSI B31.1 Code for Power Piping where applicable, base pressure rating on hot/chilled water piping systems maximum design pressures. Provide sizes and types matching piping and equipment materials used in hot/chilled water piping systems. Where more than one type of material or product is indicated, selection is engineer's option.

2.02 BASIC IDENTIFICATION

- A. General: Provide identification complying with Division 15 Basic Materials and Methods section "Mechanical Identification."

2.03 BASIC PIPE, TUBE AND FITTINGS

- A. General: Provide pipe, tube and fittings complying with Division 15 Basic Materials and Methods section "Pipe, Tube and Fittings," in accordance with the following listing:

- 1. Hot/chilled water AND low pressure steam piping:
 - a. Pipe size 2" and smaller: Black steel pipe.
 - 1) Pipe weight: Schedule 40.
 - 2) Fittings: Class 125 cast iron threaded.
 - b. Pipe size 2-1/2" and larger: Black steel pipe.
 - 1) Pipe weight: Schedule 40.
 - 2) Fittings: Wrought steel butt welding.

2.04 BASIC PIPING SPECIALTIES

- A. General: Provide piping specialties complying with Division 15 Basic Materials and Methods section "Piping Specialties."

2.05 BASIC SUPPORTS, ANCHORS AND SEALS

- A. General: Provide supports, anchors and seals complying with Division 15 Basic Material and Methods section "Supports, Anchors, and Seals." Supports and anchors provided shall meet the requirements of section 1613 of the New York State Building Code; horizontal and vertical runs of pipe shall be securely supported in accordance with the New York State Building Code including seismic requirements

2.06 BASIC VALVES

- A. General: Provide valves complying with Division 15 Basic Materials and Methods section "Valves," in accordance with the following listings:
 - 1. Sectional Valves:
 - a. 2" and smaller: Ball valves (hot/chilled water only).

- b. 2-1/2" and larger: rising stem or O.S.&Y. type.
- c. 2-1/2" and larger: Butterfly valves (when specifically approved by the engineer only).

2. Shutoff Valves:

- a. 2" and smaller: Ball valves (hot/chilled water only)
- b. 2-1/2" and larger: Rising stem or O.S.&Y. valves. Butterfly valves may be used only after specific approval by the engineer.

3. Heating/Cooling Terminal Outlet Valves:

- a. 2" and smaller: Balance valve (hot/chilled water only)
- b. 2-1/2" and larger: Rising Stem.

4. Drain Valves:

- a. 2" and smaller: Ball valves.

5. Check Valves:

- a. All sizes: Silent wafer type check valve.

2.07 BASIC EXPANSION COMPENSATION

A. General: Provide expansion compensation products complying with Division 15 Basic Materials and Methods section "Expansion Compensation," in accordance with the following listing:

- 1. Flexible ball pipe joints (hot/chilled water only) Use fabricated piping loops for low pressure steam or linear bellows type rated for steam service.
- 2. Pipe alignment guides and anchors.

2.08 BASIC THERMOMETERS AND GAUGES

A. General: Provide meters and gauges complying with Division 15 Basic Materials and Methods section "Thermometers and Gauges," in accordance with the following listing:

- 1. Temperature gauges and fittings.
- 2. Pressure gauges and fittings.
- 3. Flow measuring gauges.

2.09 HYDRONIC SPECIALTIES

A. General: Provide hydronic specialties complying with Division 15 section "Hydronic Specialties," in accordance with the following listing:

- 1. Balance valves.
- 2. Balance cocks.
- 3. Vent valves.
- 4. Flow control valves.
- 5. Diverting fittings.

6. Air separators.

PART 3 - EXECUTION

3.01 INSTALLATION OF BASIC IDENTIFICATION

- A. General: Install mechanical identification in accordance with Division 15 Basic Materials and Methods section "Mechanical Identification."

3.02 INSTALLATION OF HOT/CHILLED WATER WATER DISTRIBUTION PIPING

- A. General: Install water distribution piping in accordance with Division 15 Basic Materials and Methods section "Pipe, Tube and Fittings."
- B. Install eccentric reducers where pipe is reduced in size in direction of flow, with tops of both pipes and reducer flush.
- C. Install piping with 1" minimum rise in 40' pipe run (0.2%) in direction of flow.
- D. Install piping level with no pitch.
- E. Connect branch feed piping to mains at horizontal center line of mains, connect run-out piping to branches at horizontal center line of branches.
- F. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

3.03 INSTALLATION OF PIPING SPECIALTIES

- A. Install piping specialties in accordance with Division 15 Basic Materials and Methods section "Piping Specialties."

3.04 INSTALLATION OF SUPPORTS, ANCHORS AND SEALS

- A. Install supports, anchors and seals in accordance with Division 15 Basic Materials and Methods section "Supports, Anchors and Seals", and project drawings and details.

3.05 INSTALLATION OF VALVES

- A. Install valves in accordance with Division 15 Basic Materials and Methods section "Valves."
- B. Sectional valves: Install on each branch and riser, close to main, where branch or riser serves two or more heating terminals or equipment connections and elsewhere as indicated.
- C. Shutoff valves: Install on inlet and outlet of each mechanical equipment item and on inlet of each heating/cooling terminal and elsewhere as indicated.

- D. Heating/cooling terminal outlet valves: Install on outlet of each heating/cooling terminal and elsewhere as indicated.
- E. Drain valves: Install on each mechanical equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system and elsewhere where indicated or required to completely drain hot/chilled water piping system.
- F. Check valves: Install on discharge side of each pump and elsewhere as indicated.

3.06 INSTALLATION OF EXPANSION COMPENSATION PRODUCTS

- A. Install expansion compensation products in accordance with Division 15 Basic Materials and Methods section "Expansion Compensation."

3.07 INSTALLATION OF THERMOMETERS AND GAUGES

- A. Install thermometers and gauges in accordance with Division 15 Basic Materials and Methods section "Thermometers and Gauges."

3.08 INSTALLATION OF HYDRONIC SPECIALTIES

- A. General: Install hydronic specialties in accordance with Division 15 "Hydronic Specialties" section.

3.09 EQUIPMENT CONNECTIONS

- A. General: Connect hot/chilled water piping system to mechanical equipment as indicated and comply with equipment manufacturer's instructions where not otherwise indicated. Install shutoff valve and union on supply and return, drain valve on drain connection.
- B. Hot/chilled water terminals: Install hot/chilled water terminals with heating/cooling terminal outlet valve and union on outlet, union, shutoff valve on inlet. Install automatic air vent valve on element in accordance with manufacturer's instructions. Locate valves and balancing cocks behind valve access doors for ease of maintenance. Where indicated, install automatic temperature control valve with unions between all ports of the control valve.

3.10 CLEANING, FLUSHING AND INSPECTING

- A. General: Include coils, etc. See Division 15 "Pipe Tube and Fittings".

3.11 TESTING AND BALANCING

- A. General: See Division 15 "Testing, Adjusting and Balancing."

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15511 - FIRE STOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in/ joints between fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- A. Only tested fire stop systems shall be used in specific locations as follows:
 - 1. Penetrations for the passage of ductwork, cable, cable tray, conduit, piping, electrical bus ways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Safing slot gaps between edge of floor slabs and curtain walls.
- C. Openings between structurally separate sections of wall or floors.
- D. Gaps between the top of walls and ceilings or roof assemblies.
- E. Expansion joints in walls and floors.
- F. Openings and penetrations in fire-rated partitions or walls containing fire doors.
- G. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
 - 1. Section 03300 - Cast-In-Place Concrete Work
 - 2. Section 07900 - Caulking
 - 3. Section 04200 - Unit Masonry
 - 4. Section 09200 - Lath and Plaster
 - 5. Section 09250 - Gypsum Wall Board
 - 6. Section 15050 - Basic Materials and Methods
 - 7. Section 15250 - Mechanical Insulation

1.05 REFERENCES

- A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 - 1. UL Fire Resistance Directory:
 - a. Fire stop Devices (XHJI)
 - b. Fire Resistance Ratings (BXUV)
 - c. Through-Penetration Fire stop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 - 2. Alternate "Omega Point Laboratories Directory" (updated annually)
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems" (July 1998.)
- D. Test Requirements: ASTM E 1966-01, "Standard test method for Fire Resistive Joint Systems"
- E. Inspection Requirements: ASTM E 2174 - 01, "Standard Practice for On-site Inspection of Installed Fire Stops."
- F. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- G. ASTM E-84-01, Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. All major building codes: ICBO, SBCCI, BOCA, and IBC.
- I. NFPA 101 - Life Safety Code
- J. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time).

1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.

- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
 - 1. Hilti, Inc., Tulsa, Oklahoma (or equal)
800-879-8000

2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Cast-in place firestop devices for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are

acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device
 - a. Add Aerator adaptor when used in conjunction with aerator ("sovent") system.
 2. Hilti CP 681 Tub Box Kit for use with tub installations.
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant
 2. Hilti CP 604 Self-leveling Firestop Sealant
 3. Hilti CP 620 Fire Foam
 4. Hilti CP 606 Flexible Firestop Sealant
 5. Hilti CP 601s Elastomeric Firestop Sealant
- D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
1. Hilti CP 601s Elastomeric Firestop Sealant
 2. Hilti CP 606 Flexible Firestop Sealant
 3. Hilti FS-ONE Intumescent Firestop Sealant
- E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. Hilti CP 672 Speed Spray
 2. Hilti CP 601s Elastomeric Firestop Sealant
 3. Hilti CP 606 Flexible Firestop Sealant
 4. Hilti CP 604 Self-leveling Firestop Sealant
- F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
1. Hilti CP 677 Speed Plugs
 2. Hilti CP 767 Speed Strips
- G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
1. Hilti FS-ONE Intumescent Firestop Sealant
- H. Foams, intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti FS-ONE Intumescent Fire stop Sealant
 2. Hilti CP 618 Fire stop Putty Stick
 3. Hilti CP 620 Fire Foam
 4. Hilti CP 601s Elastomeric Fire stop Sealant

- 5. Hilti CP 606 Flexible Fire stop Sealant
- I. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. Hilti CP 618 Fire stop Putty Stick
- J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
 - 1. Hilti CP 617 Fire stop Putty Pad
- K. Fire stop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
 - 1. Hilti CP 642 Fire stop Collar
 - 2. Hilti CP 643 Fire stop Collar
 - 3. Hilti CP 645 Wrap Strips
- L. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical bus ways in raceways, the following products are acceptable:
 - 1. Hilti CP 637 Trowelable Fire stop Compound
 - 2. Hilti FS 657 FIRE BLOCK
 - 3. Hilti CP 620 Fire Foam
- M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical bus ways in raceways, the following products are acceptable:
 - 1. Hilti FS 657 FIRE BLOCK
- N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
 - 1. Hilti CP 672 Speed Spray
 - 2. Hilti CP 601s Elastomeric Fire stop Sealant
 - 3. Hilti CP 606 Flexible Fire stop Sealant
 - 4. Hilti CP 604 Self-Leveling Fire stop Sealant
- O. Provide a fire stop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- P. Provide a fire stop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which fire stop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Fire stop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place fire stop devices without interferences.

3.03 INSTALLATION

- A. Regulatory Requirements: Install fire stop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
 - 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL fire stop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - 3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing fire stop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess fire stop materials and soiling as work progresses.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15515 - HYDRONIC SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Extent of hydronic specialties required by this section is indicated on drawings, and/or specified in other Division 15 hydronic piping system sections.
- B. Types of hydronic specialties specified in this section include the following:
 - 1. Balance valves.
 - 2. Vent valves.
 - 3. Flow control valves.
 - 4. Diverting fittings.
 - 5. Air separators.
 - 6. Compression tanks.
 - 7. Pump discharge valves.
 - 8. Shot feeders.
 - 9. Water relief valves.
 - 10. Pressure reducing valves.
 - 11. RPZ - Backflow Preventer

1.03 QUALITY ASSURANCE

- A. Materials and equipment shall be provided by one of the manufacturers listed in Part 2 - Products. Materials and equipment from other manufacturers may be accepted if proven equal to those specified. This contractor is liable for and shall pay for all architectural and engineering review and redesign costs for substitute materials and equipment. This contractor also is liable for all costs of changes in the work required by substitute equipment.
- B. The length of time the manufacturer has been in business, the location and capability of complete repair facilities, availability of repair parts and annual maintenance contracts all will be considered in determining equality. Refer to requirements pertaining to substitute materials and equipment.

1.04 SUBMITTALS

- A. Product data - submit catalog cuts, specifications, installation instructions and dimensioned drawings for each type of manufactured hydronic specialty. Include pressure drop curve or chart for each type and size of hydronic specialty.

- B. Shop drawings - submit for fabricated specialties, indicating details of fabrication, materials and method of support.
- C. Maintenance data - submit maintenance data and spare parts lists for each type of manufactured hydronic specialty. Include this data in maintenance manual.
- D. Hydronic specialty types - provide hydronic specialties of same type by same manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURED HYDRONIC SPECIALTIES

- A. General - provide factory fabricated hydronic specialties recommended by manufacturer for use in service indicated. Provide hydronic specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by the engineer to comply with installation requirements. Provide sizes as indicated and connections which properly mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is the engineers' option, but more than one type cannot be used on project.
- B. Balance valves:
 - 1. General - provide balance valves as indicated, of one of the following types:
 - a. Threaded ends 2" and smaller - Class 125, bronze body, ball valve with memory stop.
 - b. Soldered ends 2" and smaller - Class 125, bronze body, ball valve with memory stop.
 - c. Threaded, soldered, of flanged end globe style providing three (3) functions:
 - 1) Precise flow measurement
 - 2) Precision flow balancing
 - 3) Positive shut-off, no drip seat, teflon disk, 1-1/2" to 2" size - drain connection with protective cap.
- C. Vent valves:
 - 1. Manual vent valves - provide manual vent valves designed to be operated manually with screwdriver or thumbscrew, 1/8" N.P.T. connection.
 - 2. Automatic vent valves - provide automatic vent valves designed to vent automatically with float principle, stainless steel float and mechanisms, cast iron body,

pressure rated for 125 psi, 1/2" N.P.T. inlet and outlet connections.

3. Manufacturer - subject to compliance with requirements, provide vent valves of one of the following:

- a. Bell & Gossett, ITT Fluid Handling Div.
- b. Taco, Inc.
- c. Armstrong Co.

D. Flow control valves:

1. General - provide flow control valves pressure rated for 125 psi, containing lift check assembly which will automatically open by means of pump flow pressure, and automatically close when pump is not operating. Provide with means to manually open in case of pump failure.

- a. Threaded ends 2" and smaller - cast iron body, bronze check mechanism, screw-in bonnet, straight or angle pattern.
- b. Soldered ends 1 1/4" and smaller - cast bronze body, bronze check mechanism, screw in bonnet, straight or angle pattern.
- c. Threaded ends 2 1/2" through 4" - cast iron body, bronze check mechanism, screw in bonnet, straight or angle pattern.

2. Manufacturer - subject to compliance with requirements, provide flow control valves of one of the following:

- a. Bell & Gossett, ITT Fluid Handling Div.
- b. Taco, Inc.
- c. Armstrong Pump Co.

E. Diverting fittings:

1. General - provide diverting fittings as indicated for one pipe hydronic piping systems. Construct fittings of cast iron with threaded ends or wrought copper with solder ends, pressure rated for 125 psi. Provide indication on fitting of direction of flow for supply or return applications. Furnish flow and pressure drop curves based on manufacturer's testing with submittal.
2. Manufacturer - subject to compliance with requirements, provide diverting fittings of one of the following:

- a. Armstrong Pumps, Inc.
- b. Bell & Gossett, ITT Fluid Handling Div.

F. Air Separators:

1. General - provide air separators pressure rated for 125 psi. Select capacity based on total system gpm.
2. Dip tube fittings - provide dip tube fittings in boilers as

indicated to prevent free air collected in boiler from rising into system.

3. In-Line air separators - provide in-line air separators as indicated. Construct sizes 1 1/2" and smaller of cast iron, and sizes 2" and larger of steel complying with ASME Boiler and Pressure Vessel Code and stamped with "U" symbol. Furnish National board Form U-1 denoting compliance.
4. Combination separator/strainer - provide external combination air separators/strainers as indicated. Construct of steel complying with ASME Boiler and Pressure Vessel Code and stamped with "U" symbol. Furnish National Board Form U-1 denoting compliance. Provide galvanized steel integral strainer with 3/16" perforations and free area of not less than 5 times cross sectional area of connecting lines. Provide tangential inlet and outlet connections and internal stainless steel air collector tube designed to direct released air into compression tank. Provide blowdown connections.
5. Manufacturer - subject to compliance with requirements, provide air separators of one of the following:
 - a. Armstrong Pumps, Inc.
 - b. Bell & Gossett, ITT Fluid Handling Div.
 - c. Taco, Inc.

G. Compression tank:

1. General - provide compression tanks of size and number as indicated. Construct of steel for 125 psi pressure rating complying with ASME Boiler and pressure Vessel Code and stamped with "U" symbol. Furnish National Board Form U-1 denoting compliance. Provide tapings in bottom of tank for tank fitting.
 - a. Tank fittings - provide tank fittings for compression tanks as indicated, sized for compression tank diameter. Design tank fittings for 125 psi pressure rating and include manual vent to establish proper air volume in tank on initial fill.
2. Manufacturer - subject to compliance with requirements, provide compression tanks and tank fittings of one of the following:
 - a. Armstrong Pumps, Inc.
 - b. Bell & Gossett, ITT Fluid Handling Div.
 - c. Taco, Inc.

H. Diaphragm type compression tanks:

1. General - provide diaphragm compression tanks of size and number as indicated. Construct tank of welded steel, constructed, tested and stamped in accordance with Section VII of the ASME Boiler and Pressure Vessel Code for a working pressure of 125 psi. Furnish National Board Form U-1 denoting compliance. Support vertical tanks with steel legs or base, support horizontal tanks with steel saddles. Provide specially compounded flexible diaphragm securely sealed into tank to permanently separate air charge from system water, to maintain design expansion capacity. Provide pressure gauge and air charging fitting.
2. Manufacturer - subject to compliance with requirements, provide diaphragm type compression tanks of the following:
 - a. Bell & Gossett, ITT Fluid Handling Div.
 - b. Armstrong Pumps, Inc.

I. Pump discharge valves:

1. General - provide pump discharge valves as indicated. Provide Non-slam check valve with spring loaded disc and calibrated adjustment feature permitting regulation of pump discharge flow and shutoff. Provide flanged cast iron valve body, pressure rated for 175 psi, maximum operating temperature of 300 degrees F. Provide straight or angle pattern as required.
2. Manufacturer - subject to compliance with requirements, provide Pump discharge valves of one of the following:
 - a. Armstrong Pumps, Inc.
 - b. Bell & Gossett, ITT Fluid Handling Div.

J. Shot feeders:

1. General - provide shot feeders of 5 gallon capacity or otherwise as indicated, constructed of cast iron or steel, for introducing chemicals in hydronic system. Provide funnel and valve on top for loading drain valve in bottom, and recirculating valves on side. Construct for pressure rating of 125 psi.
2. Manufacturer - subject to compliance with requirements, provide shot feeders of one of the following:
 - a. Culligan USA
 - b. Laboratories, Subsidiary of Clow Corp.
 - c. Mougul Div., The Dexter Corp.

K. Water relief valves:

1. General - provide water relief valves as indicated, of size and capacity as selected by Installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.
 - a. Combined pressure temperature relief valves - bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F (99 C) and pressure relief as indicated on drawing.
 - b. Pressure relief valves - bronze body, test lever, ASME rated. Provide pressure relief at as indicated on drawing.
2. Manufacturer - subject to compliance with requirements, provide water relief valves of one of the following:

L. Pressure Reducing Valves:

1. General - provide pressure reducing valves as indicated, of size and capacity as selected by Installer to maintain operating pressure on boiler system.
2. Construction - brass body, low inlet pressure check valve, inlet strainer removable without system shutdown, non-corrosive valve seat and stem, factory set at operating pressure.
3. Manufacturer - subject to compliance with requirements, provide pressure reducing valves of one of the following:
 - a. Bell & Gossett, ITT Fluid Handling Div.
 - b. Taco, Inc.
 - c. Armstrong Pumps, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Balance valves:

1. General - Install on each hydronic terminal and elsewhere as indicated.

B. Vent valves:

1. Manual vent valves - install manual vent valves on each hydronic terminal at highest point, and on each hydronic piping drop in direction of low for mains, branches and runouts and elsewhere as indicated.

2. Automatic vent valves - install automatic vent valves at top of each hydronic riser and elsewhere as indicated. Install shutoff valve between riser and vent valve, pipe outlet to suitable plumbing drain, or as indicated.
- C. Flow control valves:
1. General - install flow control valves on discharge of each pump serving a hot water heating system or zone and elsewhere as indicated. Install in upright position in a horizontal line with adequate clearance for service and replacement. Adjust flow sensitivity for automatic operation.
- D. Diverting fittings:
1. General - install diverting fittings as indicated and in accordance with manufacturer's instructions. Position fittings on supply and return mains with proper orientation for flow.
- E. Air separators:
1. Dip tube fittings - install dip tube fittings in boiler outlet in accordance with manufacturer's instructions. Run piping to compression tank pitched towards tank at 1" rise in 5' runs (1.7%).
 2. In-Line air separators - install in-line air separators in pump suction lines. Connect inlet and outlet piping. Run piping to compression tank pitched towards tank at 1" rise in 5' run (1.7%). Install drain valve on units 2" and over.
 3. Combination separator/strainer - install external combination separators/strainers in pump suction lines. Connect inlet and outlet piping. Run piping to compression tank pitched towards tank at 1" rise in 5' run (1.7%). Install blowdown valve and piping. Remove and clean strainer after 24 hours and again after 30 days of system operation.
- F. Compression tanks:
1. General - install compression tanks on trapeze hangers sized for tank fully loaded, or otherwise as indicated. Install tank fitting and drain valve in tank bottom and charge tank in accordance with manufacturer's instructions.
- G. Diaphragm type compression tanks:
1. General - install diaphragm type compression tanks on floor as indicated, in accordance with manufacturer's instructions. Vent and purge air from hydronic system, charge tank with proper air charge as recommended by manufacturer.

H. Pump discharge valves:

1. General - at engineers option, install pump discharge valves on each pump discharge line in lieu of separate shutoff valve, check valve, and balance cock. Install in horizontal or vertical position with stem in upward position, allow clearance above stem for check mechanism removal. After hydronic system has been completed, mark calibrated name plate with stripe of yellow lacquer to permanently mark final balanced position.

I. Shot feeders:

1. General - install shot feeders on each hydronic system at pump discharge and elsewhere as indicated. Install in upright position with top of funnel not more than 48" above floor. Install in pump discharge line as indicated.

J. Water relief valves:

1. General - Install on hot water generators and elsewhere as indicated. Pipe discharge to floor. Comply with ASME Boiler and Pressure Vessel Code. Cut discharge pipe at 45° angle.

K. Pressure reducing valves:

1. Install for each hot water boiler or heat exchanger as indicated, and in accordance with manufacturer's installation instructions.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15656 - TEMPERATURE CONTROL SYSTEMS

1.01 GENERAL

- A. It is the intent of this specification to overhaul, refurbish or replace, and modernize the existing automatic temperature control systems at buildings listed to effect more efficient operation and energy conservation savings. Replacements shall be by the same manufacturer as existing equipment unless otherwise specified.
- B. The system shall be complete in all respects including labor, materials, equipment, and services necessary and shall be installed by personnel regularly employed by a control manufacturer.
- C. All new pneumatic tubing shall be plastic tubing and shall be concealed. If not concealed, tubing shall be copper and, if subject to vandalism, shall be hard shell copper.
- D. The existing system shall consist of any device, tubing, etc. supplied or installed by the original temperature control manufacturer and any additions or modifications made to that system up until the present time. The Contractor accepts responsibility for all equipment, etc., regardless of the installer. The Contractor shall locate and identify all pneumatic, electric and pneumatic electric control devices associated with the building, and, if a control manufacturer would normally indicate this type of device on their schematic as supplying or installing this device, it shall be considered as part of this contract. Therefore, items such as boiler controls, mechanical devices such as pumps, motors, etc., are excluded.
- E. Vandalized or missing controls at the time of bid become the Contractor's responsibility. Vandalism occurring after the time of contract award must be demonstrated to the Engineer as such if the Contractor anticipates additional compensation.

1.02 MATERIALS AND METHODS

- A. Work shall include, but not be limited to, the following:
 - 1. System Purge: Using a minimum of 20 gallons of an exceptionally pure Halo carbon refrigerant, purge the existing system by inserting a tank between the compressor discharge and the pressure reducing valve and introduce refrigerant by the bubbling method. All end of line automatic temperature control valves and a minimum of 10 valves between the compressor and the end of the line valves shall be cracked to allow oil to escape from the system.
 - a. Caution shall be taken not to allow excessive air leakage which will cause the compressors to run continuously during the cleaning operation. The Contractor shall leave thermostats and controllers in the air distribution system while the cleaning solvent

is being introduced.

- b. At least 16 thermostat locations (4 end of line locations, 8 in close proximity to the compressor, and 4 at intermediate locations on DIFFERENT zones) shall be checked prior to and after the application to verify satisfactory results.
 - c. Should oil be present in the air system after the first application of the cleaning solvent, the procedure shall be repeated until oil is no longer present.
 - d. In order to prevent diaphragm or seal failure, at no time during the purging of air lines shall the systems air pressure be allowed to exceed maximum operating pressures of any one control unit.
- 2. Oil Filters: Provide one pre-filter before air dryer and one final filter after air dryer, each piped in with a bypass line with valve to allow filter replacement. Filters shall have replaceable cartridges. If filters are existing, cartridges shall be replaced.
 - 3. Valves: If a valve is passing steam or hot water in the closed position, the disc must be replaced at a minimum and the valve seat resurfaced, if necessary. All leaking valve packings must be repacked. All moving parts shall operate as per original design; if not, the Contractor shall replace the valve with new.
 - 4. Piping: The pneumatic system must be checked for leaks and demonstrated as tight.
 - 5. Dampers: All dampers are to be lubricated and adjusted for smooth operation and tight close off. Damaged or missing linkages are to be repaired or replaced. Service, repair, or replace damper motors to ensure proper operation.
 - 6. Outside Temperature Controllers: Repair or replace as required all outside temperature controllers.
 - 7. Classroom Control Retrofit:
 - a. Repair or replace each airstream thermostat, damper motor, and miscellaneous components in the unit vents.
 - b. Calibrate, adjust, and balance each unit ventilator for day and night cycles of operation.
 - c. Free lubricate and adjust all automatic dampers for smooth positioning and tight closure. Service, repair, or replace damper motors and adjust linkages for proper operation.
 - d. Check, service, repair, or replace and adjust all miscellaneous control devices (i.e. pressure switches, solenoids, relays, manual switches, program clocks,

etc.).

- e. Furnish and install unbreakable injection molded opaque guards with tamper proof screws and heavy metal mounting brackets. Guards to be installed over all thermostats.

- f. Sequence of Operation:

- 1. Unit Ventilator: When the room temperature is at the high end of its throttling range (approximately 75°F), the outdoor air damper is wide open, subject to the mixed air controller and the unit is on full cooling cycle. As the room temperature decreases, the damper throttles closed with no minimum setting. Provide a "float zone" of approximately 3-5°F between the close of the cooling cycle and the start of the heating cycle to allow internal heat gains to maintain conditions above the thermostat set point whenever possible. After a further decrease in room temperature, the valve shall begin to open and is fully open at the low end of the throttling range (approximately 68°F). On an increase in room temperature, the reverse of the above shall take place. Whenever the outdoor air temperature is below 35°F, the outdoor air damper shall be in the closed position.
- 2. Air Handlers: Existing set point control shall be converted to space "demand" control of both the "heating" and "cooling" functions. Provide sequencing valve and dampers so that all call for heating with be accomplished using recirculated air only. When the system is on its cooling cycle, temperatures shall be controlled by mixing outdoor and return air to eliminate reheating same. Whenever the outdoor air temperature is below 35°F, the outdoor air damper shall be in the closed position, except on 100 percent outdoor air systems.

- 8. General:

- a. All controls must be checked for sequence of operation during the heating season as well as cooling season. Unit vents, H & V units, AC units, fan coils, unit heaters, cabinet heaters, central panel controls, day/night system, exhaust fans, etc., must all be seen in actual operation and perform according to the original sequence of operation. Replace all fan coil air vents, clean coils/drain pans and unit interiors, replace belts and lubricate bearings and valves, install new air filters, etc. for a complete and operating system.

- b. A signed sticker applied at the control device is required inside every control cabinet, unit vent, etc. The burden of proof that the control was looked at and proven functional is the Contractor's responsibility. Failure to apply stickers may be cause for redoing that system.
- c. It should be noted that the Contractor will be required to demonstrate entire system functioning when the project is complete. If a pattern develops of problems with the controls at the time of inspection, the Contractor is open to the liability of redoing entire sections of the building. Again, the intent is to demonstrate a complete and functional system and to repair or replace as necessary to accomplish that end.

1.03 QUALIFICATIONS OF BIDDERS

- A. The Contractor shall have at least ten (10) years experience in servicing and maintaining temperature control systems and must be able to furnish the Owner/Engineer at least 10 projects of a similar nature successfully completed within the past 5 years. The Contractor shall also have an on-hand inventory of at least \$100,000 of temperature controls.
- B. Installation by wholesalers, contractors, or franchise dealers, or any such firm whose principle business is not that of manufacturing and installing temperature control systems is not acceptable.

1.04 GUARANTEE

- A. The Contractor shall guarantee all workmanship and materials to be free from defects for a period of one (1) year from date of acceptance, and, if proven defective, it will be replaced or repaired free of charge. All work shall ensure a complete and efficient system upon completion.

1.05 BIDDERS TO EXAMINE SITE

- A. Bidders shall be held to have accepted terms and conditions of all contract documents, to have examined the building and site and all conditions that may affect the work as well as all parts of specifications, and fully inform themselves of existing conditions. No claim for relief of mistakes in bid will be entertained; each bidder shall be held strictly to his bid.

1.06 SUPERVISION AND SAFETY PRECAUTIONS

- A. The Contractor shall, at all times, provide adequate and proper supervision of the work and supply the safety precautions as set forth by the Department of Labor. The Contractor shall have sole responsibility in the enforcement of all Federal Safety Precautions and laws.

1.07 SCOPE OF OPERATION

- A. The following new equipment and controls shall be added to the automatic temperature control system.
1. Install refrigerated air driers, Arrow, Hankinson, or equal. Install new pre and final oil filters.
 2. Contractor shall provide and install new Paragon EC 404 optimal start programmer with Xencon XTS-4 or equal electronic time switch in lieu of existing mechanical time clocks all tied into existing building heating controls, to provide automatic start-up of heating system. These devices are to be installed to allow maximum day/night switching capability and are to be integrated with the day/night auto switches. At the completion of the panel rehab, all parts of the day/night switching system will be demonstrated as 100 percent operational. The Contractor shall demonstrate how each zone runs in day cycle, night cycle, and how the night cycle restores if the zone falls below night setback temperature. All building air moving equipment will be off on night cycle unless maintaining night setback.
 3. Contractor shall be responsible for all power wiring as well as control wiring, etc., for all new equipment such as compressors, driers, digital optimizer, electronic time clock, etc.
 4. Work described above should be performed, where applicable, and each Contractor shall provide a complete pre-bid survey to substantiate replacements and repairs.
 5. No new equipment will be supplied or installed without submittal of schematics showing complete piping and wiring as well as all pertinent technical data. All controls used other than original manufacturer must be submitted to Engineer for approval.
 7. Pneumatic Compressors: Compressors shall be Quincy or equal with tank mounted single stage air compressors complete with belt guard after cooler, electric alternation, a pre and final oil filter assembly, automatic tank drain, and all necessary gauges, etc., as required for a complete and operating system. Tank mounted compressors shall be equal in size to existing compressors. New units shall be equipped with pressure gauges, safety valve, tank drain, shut off valve, and all magnetic motor starters. Tank shall conform to ASME National Board specification. An intake filter silencer, service valve, and Vee belt drivers shall be provided. The motor and pressure switches shall be to NEMA standards. Unit shall be tied into all existing lines, etc., as required. New compressors shall be sized for a one third run time. Compressor shall also be supplied with vibration pads, disconnects, wiring and piping. Unit shall be run through a factory-break-in period and tested for low oil carryover, air delivery, leakage, and power consumption. Proof of this break in/test period shall be provided with the delivery of the new unit.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15768 - UNIT VENTILATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary conditions and Division 1 Specification sections, apply to work of this section.

1.02 SUMMARY

- A. Extent of unit ventilator work indicated on drawings and schedule by requirements of this section.
- B. Unit ventilators specified in this section include the following:
 - 1. Hot water-heating coil.
 - 2. Steam Heating Coil
 - 3. Chilled water-cooling coil (where applicable).
 - 4. DX Cooling Coil (where applicable).
- C. Related Sections: Refer to other Div. 15 sections for the following:
 - 1. Hot/Chilled water piping
 - 2. Refrigerant Piping
 - 3. Steam Piping
- D. Other divisions: Refer to Div. 16 sections for the following:
 - 1. Power wiring.

1.03 SUBMITTALS

- A. Product data - submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights, furnished specialties and accessories, and installation and start-up instructions.
- B. Shop drawings - submit manufacturer's assembly type shop drawings indicating dimensions, weight loadings, required clearances and methods of assembly of components. Wiring diagrams - submit manufacturer's electrical requirements for power supply wiring for packaged heating and cooling units. Submit manufacturer's ladder type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.
- C. Maintenance data - submit maintenance data and parts list for each unit ventilator, control, and accessory, including "trouble-shooting" maintenance guide. Include this data and product data in maintenance manual.

1.04 QUALITY ASSURANCE

- A. Refer to section 15020 "Quality Assurance." Part 1, Item A for requirements pertaining to substitute material and equipment.
- B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with ARI 440 for testing and rating units.
- D. Comply with ASHRAE 33 for testing hydronic coils.
- E. Comply with NFPA 70 for components and installation.
- F. UL Compliance - provide unit ventilators which are listed by UL and have UL label affixed.

1.05 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace unit ventilators that fail in materials and workmanship within 1 year from date of substantial completion.

1.06 EXTRA MATERIALS

- A. Furnish extra materials described below that match product installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Unit Ventilator Filters: Furnish 2 spare filters for each filter installed.
 - 2. Motors: Furnish (2) spare motors for each size unit ventilator motor size used on the project.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle unit ventilators and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged packaged heating and cooling units or components, replace with new.
- B. Store unit ventilators and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Magic Aire / Carrier
2. McQuay International
3. Trane Company (The): North American Commercial Group
4. Carrier Corp.

2.02 UNIT VENTILATORS

- A. Description: A vertical, floor-mounting assembly including cabinet, filter, coil, fan and motor in draw-through configuration with the following:

1. Heating coil
2. Cooling coil (where applicable)
3. Temperature controls (field installed)

2.03 MATERIALS

- A. Unit Frame: Welded, galvanized heavy gage steel.
- B. Insulation: 1-inch (25mm) duct liner complying with ASTM C1071 and attached with adhesive complying with ASTM C916.
1. Fire-Hazard Classification: Duct liner and adhesive shall have a maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E84.
- C. Drain Pans: Galvanized steel, with connection for drain. Drain pan shall be insulated with polystyrene or polyurethane insulation.
- D. Cabinet: Galvanized steel, with removable panels fastened with tamperproof fasteners and key-operated access door.
- E. Cabinet Finish: Phosphatize coat with baked-on primer and manufacturer's standard paint, in color selected by Architect.
- F. Cabinet Top: Galvanized steel, with baked enamel finish.
- G. Discharge Air: Welded steel linear bar grille.
1. Air-Outlet Location: Top
- H. Outdoor Louver: Types and sizes as scheduled with the following features and provisions:
1. Horizontal wall intake louver.
 2. Construction: Aluminum.
 3. 1/2-inch (13 mm) mesh screen on interior side of intake.
 4. Finish: Color by Architect.
 5. Protective grille for louver - Color by Architect.

- I. Mixing Dampers: Steel damper blades with edge and side seals and nylon bearings, operated by factory-mounted operator to control outside-air/return air.
- J. Face and Bypass Dampers (Where applicable): Steel damper bladed with edge and side seals and nylon bearings, operated by factory-mounted electric operator.

2.04 COILS

- A. Hot Water / Steam Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm) and rated for a minimum working pressure of 300 psig (2068 kPa) and a maximum entering water temperature of 275 deg. F (135 deg. C) with manual air vent and drain plug.
- B. Chilled Water Coil: Copper tube, with mechanically bonded aluminum fans spaced no closer than 0.1 inch (2.5 mm) and rated for a minimum working pressure of 200 psig (1378 kPa) with manual air vent and drain plug.

2.05 FAN

- A. Centrifugal, with forward-curved wheels and fan scrolls made of galvanized steel or thermoplastic material; directly connect to motor.

2.06 FAN MOTORS

- A. Permanent split capacitor multispeed motor with integral thermal-overload protection and resilient mounts. Connect motor to chassis wiring with plug connection.

2.07 FILTERS

- A. Filters: 1-inch (25-mm) thick, glass-fiber media.

2.08 ACCESSORIES

- A. Storage Cabinets:
 - 1. Material: Bottom, back and sides of cabinet to be 18-ga. Steel. Fully adjustable shelves to be 18-ga. Steel. Unit base to be 16-ga. Steel.
 - 2. Cabinet to have open space with false back for piping and electrical circuits.
 - 3. Finish: powder coat finish with color selected by architect.
 - 4. Units to be provided with sizes and quantities shown on architectural drawings.

2.09 CONTROL SYSTEMS

- A. Automatic Temperature Controls: Field installed controls to be furnished as described under section 15903 of this specification. In addition to section 15903, the following control items shall be included:
1. Provide occupant adjustment capability for the following:
 - a. Room temperature set point.
 - b. Minimum outside-air percentage.
 - c. Unoccupied room temperature set point.
 2. Controls components shall include the following:
 - a. Thermistor mounted in unit return air with manual adjustable override.
 - b. Ventilation lockout relay to close ventilation damper during occupied operation.
 - c. Exhaust fan interlock relay to open outside damper when exhaust fan is on or to open depressurization damper when outdoor air damper is open (dampers to operate in parallel).
 - d. Day-night control switch.
 - e. Day-night control relay for remote signal.
- B. Safety Devices: Each unit shall have the following safety devices:
1. Manual disconnect switch.
 2. Spring-loaded interlock de-energize control circuit, fan, and heating elements when front panel is removed.
 3. Heat-dissipation switch keeps fans running when unit discharge temperature rises above 100 deg. F (38 deg. C).
 4. Overcurrent protective fuses.
 5. Branch-circuit fusing to protect heating-element subdivision circuits (maximum 48 A).
 6. Motor and control circuit fuses.
 7. Low-temperature, cutout thermostat strapped to air coil prevents coil from freezing and liquid from slugging.
- C. Control Devices: Field mount the following devices:
1. Outside-air damper actuator.
 2. Discharge air thermostat.
 3. Heating-coil valve.
 4. Cooling-coil valve (where applicable).
 5. Face and bypass damper actuator (where applicable).
 6. Room thermostat.
 7. Freeze protection thermostat.
 8. Cooling lockout thermostat.

2.10 SOURCE QUALITY CONTROL

- A. Verification of Performance: Test and rate condensing units according to ARI 210/240.
- B. Test unit ventilator coils according to ASHRAE 33.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install unit ventilators to comply with NFPA 90A.
- B. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.
- C. General Contractor to install storage cabinets per architectural drawings/details.

3.02 CONNECTIONS

- A. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
- B. Install piping adjacent to machine to allow service and maintenance.

3.03 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality control testing and report results in writing:
 - 1. After electrical circuitry has been energized, start units to conform proper motor rotation and unit operation.
 - 2. Test and adjust controls and safeties.
- B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15800 - AIR DISTRIBUTION

1.01 GENERAL

- A. Construct all apparatus of materials suitable for the conditions encountered during operation.
- B. Where corrosion can occur, appropriate corrosion-resistant materials and assembly methods must be used including isolation of dissimilar metals against galvanic interaction.
- C. All factory applied acoustical and thermal insulation, including facing and adhesives, it to be fire-resistant and to conform to requirements of NBFU and State Codes.
- D. Where in contact with the air stream, protect insulation against erosion or flaking by a factory applied plastic or mat facing.
- E. Locate and arrange motors, eliminators, filters, cooling and heating coils, and other components and accessories so that they are accessible for repair, maintenance, and replacement.
- F. Mount grease fitting directly on bearings unless the latter are not readily accessible. Where equipment bearings are not visible or are inaccessible, provide easily accessible extensions to bearing lubrication fittings.
- G. Thoroughly clean the entire system before installing filters or operating the fans.
- H. On systems containing filters, install filters and permanently seal the filter frames airtight before operating the fans. The Contractor, at his own expense, shall replace all dirty filters before turning over the system to the Owner, and furnish the Owner with one complete set of replacement filters for all banks. Seal all outlets around the edges to prevent air leakage.
- I. Bracing and supports indicated are the minimum acceptable. Install additional bracing or supports to eliminate any distortion or vibration when the systems are operating or under tests.
- J. Install ducts, castings, and hangers plumb and level, with joints square and devoid of sharp edges.
- K. Unless otherwise specified, construct all duct work, including angles, bars, and other bracings, hangers, supports, and accessories of galvanized steel, all in accordance with schedules in the latest ASHRAE Guide.
- L. Diffusers, grilles, registers, and transfers shall be sized and located as shown on the drawings.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15802 - INSPECTION TESTING, AND BALANCING

1.01 GENERAL

- A. All tests shall be conducted in the presence of a representative of the Owner and/or the Architect, by a qualified vendor specializing in balancing of air systems.
- B. The H.V.A.C. systems shall be adjusted, balanced, and set so as to provide the temperature and air volumes required and as shown on the drawings.
- C. The Contractor shall demonstrate that all air distribution systems and apparatus fulfill the requirements of the specifications and shall operate the equipment for a sufficient time to properly adjust the controls and conscientiously instruct the Owner's representatives in the care and operation of the systems.
- D. The Contractor shall obtain and pay for all required inspections and permits required by State Ordinances and by the NBFU and provide all required testing equipment. All equipment shall be properly calibrated.
- E. The Contractor shall refer to ASHRAE handbook, "Testing, Adjusting, and Balancing" A.A.B.C. and N.E.B.B. required testing procedures.
- F. Balance all systems to design ratings, record pressure drop readings across all major systems, and make flow and pressure measurements.
- G. Record all measurements, complete all flow diagrams, and submit complete to the Architect.

1.02 SCOPE

- A. This section outlines the recommended test and inspection procedures to be followed in the inspection of any H.V.A.C. plant prior to acceptance and subsequent operation. In addition, the areas of responsibility are defined such that all tests and inspections are conducted in a manner to assure that the system meets the requirements of all applicable codes.

1.03 PRELIMINARY PROCEDURES

- A. It shall be the responsibility of the Contractor to complete the following work prior to conducting and tests:
 - 1. Installation of the system(s) and all applicable controls and accessories as outlined in the specifications and/or drawings.
 - 2. Ensure all wiring is permanently affixed. Temporary wiring and/or connections will not be permitted during testing.

- B. It shall be the responsibility of the Contractor, under the direction of the Architect, to perform electrical continuity tests only to ascertain that the field wiring is correct from the H.V.A.C. equipment control panel terminal strip to the H.V.A.C. equipment controls.

1.04 TESTS

- A. Test all electrical components, including starters and heaters, overload equipment, scanner system, all controls, valves, and safety equipment.
- B. Test all circulation air portions of the air distribution system(s).
- C. Provide a list of all components that have been satisfactorily tested. Notify the Architect, in writing, a week in advance of this test so as to permit his attendance.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15806 - FIRE DAMPERS

1.01 GENERAL

- A. Fire dampers shall be furnished and installed where shown on the drawings. Each fire damper shall be provided with access doors.
- B. Fire dampers shall be fabricated in compliance with NFPA and shall be U.L. labeled. Approved fire dampers shall be made by Air Balanced, Inc., Model 119, Type B of 319-P, or equal.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15846 - AIR-TO-AIR HEAT RECOVERY VENTILATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Packaged heat recovery ventilators (ERV's).
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Roofing work associated with the installation of roof mounted heat recovery ventilators, ductwork and duct curbs is to be co-ordinated by the Mechanical Contractor with the Roofing Contractor to maintain roof warrantee's.
 - 2. Division 15 Section "Control Systems Equipment" for control wiring and control devices connected to energy recovery units.

1.03 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, accessories, and installation and startup instructions.
- C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.
- D. Wiring diagrams detailing wiring for power and control systems and differentiating between manufacturer-installed and field-installed wiring.
- E. Maintenance data for each energy recovery unit, control, and accessory to include in the operation and maintenance manual specified in Division 1.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with provisions of the following codes:
 - 1. ASHRAE Compliance: Provide capacity ratings for energy recovery devices according to ASHRAE 84, "Method of Testing Air-to-Air Heat Exchangers."
 - 2. NRCA Compliance: Provide roof curbs for roof-mounted equipment constructed according to recommendations of NRCA.
- B. UL Standard: Provide units complying with UL 1812, "Ducted Heat Recovery Ventilators"; and shall carry the ETL label of approval.
- C. UL and NEMA Compliance: Provide ancillary electrical components required as part of energy recovery units that are listed and labeled by UL and that comply with applicable NEMA standards.
- D. Comply with NFPA 70 for components and installation.
- E. Insulation shall comply with NFPA 90A requirements for flame spread and smoke.

1.05 SEQUENCING AND SCHEDULING

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations. Roofing work associated with the installation of roof mounted heat recovery ventilators, ductwork and duct curbs is to be co-ordinated by the Mechanical Contractor with the Roofing Contractor to maintain roof warrantee's.

1.06 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
- B. Filters: Furnish one set of each type of filter specified.
- C. Fan Belts: Furnish one set of belts for each belt-driven fan in heat recovery ventilator.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Packaged Heat Recovery Ventilators:
 - a. Venmar Ventilation Inc.

- b. Carnes
- c. MicroMet1

2.02 PACKAGED HEAT RECOVERY VENTILATORS

A. General

- 1. Packaged, outdoor energy recovery ventilator consisting of an enthalpy wheel, wheel drive system, ventilation air fan, exhaust air fan, necessary dampers, temperature sensors and controls. All regularly maintained parts must be serviceable in less than 7 minutes.

B. Unit Cabinet

- 1. Cabinet shall be constructed of 20 gauge G90 galvanized steel with 12 gauge galvanized frame.
- 2. Unit shall have no screw penetrations on the roof and shall be airtight and waterproof.
- 3. Unit shall have lifting holes at the unit base for rigging onto rooftop.
- 4. Cabinet shall be insulated throughout with a minimum 1" [25mm] foil faced fire retardant material.
- 5. Main access panel(s) shall be easily removable to provide access to all components.
- 6. Enthalpy wheel shall be easily removable from the unit.

C. Operating Characteristics

- 1. Unit shall be capable of providing a constant volume of air at a specified external static pressure at all fan operating speeds.

D. Blowers

- 1. Fan ratings are based on tests made in accordance with AMCA Standard 210.
- 2. Blowers must be selected to operate on a stable, efficient part of the fan curve when delivering the quantities scheduled against static of the system.
- 3. Fan blades shall be statically and dynamically balanced and tested prior to shipment.
- 4. Fan shall be provided with internal vibration isolation mounts.
- 5. Fan discharge shall be as noted on the plans.
- 6. Fans shall have sealed ball bearings with L10 life expectancy.

E. Motors

1. Motors shall be continuous duty, permanently lubricated and matched to the fan loads.
2. Motors shall meet EPAC regulations for efficiency and shall have inverter spike resistance wire for protection.
3. Motor selection must include a 15% service factor.

F. Electrical Requirements

1. Unit shall have single point power connection only (120/208).
2. All controls shall be factory mounted and wired, requiring only field installation of remote sensing devices and wiring to unit mounted terminal strips. Unit controls to be compatible with building DDC system.
3. Unit shall have 24 VAC (30VA) for field installed sensing devices, etc.

G. Enthalpy Wheel

1. Enthalpy wheel substrate should be of pure aluminum foil as to allow quick and efficient uptake of thermal energy, provide sufficient mass for optimum heat transfer and give maximum sensible heat recovery at low rotational speeds.
2. Energy recovery performance for the wheel shall be rated in accordance to ARI Standard 1060-2001 and CERTIFIED to ARI. Wheels tested in independent labs in accordance to ARI Standard 1060-2001 without ARI Certification are not acceptable.
3. Enthalpy wheel shall conform to the requirements of NFPA 90A and have documented proof of smoke development of no more than 50 and flame spread of no more than 25.
4. Enthalpy drive system shall not have any take-up pulley and shall require no field adjustments by employing 0% stretch, non-adjustable drive belts.
5. Enthalpy wheel cassette shall be complete with face seal and perimeter seal to minimize EATR (Exhaust Air Transfer Ratio) when tested in accordance to ARI Standard 1060-2001.
6. Enthalpy wheel shall be self cleaned by two counter flow airstreams and come equipped in a slide out cassette for easy removal for maintenance.
7. Enthalpy wheel shall be cleanable with low temperature steam, hot water or a light detergent without degrading the latent performance and shall allow dry particles up to 800 microns to pass freely through the media to prevent clogging of the media.

2.03 CONTROLS

A. General

1. All service connectors shall be quick disconnect type.
2. Unit circuitry shall allow the following operational characteristics:
 - a. Dry contacts for occupancy control
 - b. Selection of low and high speeds
 - c. 24VAC contacts (30VA) for external components
 - d. Unoccupied recirc contacts

2.03 OPTION

A. Defrost

1. Defrost Cycle
 - a. Unit shall be equipped with defrost cycle to prevent frost from forming on the enthalpy wheel and to prevent negative pressure from occurring in the building envelope.
 - b. Unit shall be equipped with a factory mounted and factory wired microprocessor control to allow:
 1. Remote wall control interface
 2. Remote fan interlock on call for ventilation

B. Voltage/Speed

1. The following voltages as scheduled on the project drawings:
 - a. 208/1/60 - 1 speed
 - b. 208/3/60 - 1 speed
 - c. 120/1/60 - 1 speed

C. Internal Protection

1. Unit cabinet shall be lined with a 26 gauge galvanized liner to provide a readily cleanable surface and to protect vapour barrier and insulation from degradation.

D. Sensor Contacts

1. Dirty Filter Contacts - Control device and contacts shall be included to provide a signal when filters require replacing.
2. Wheel Rotation Sensor - Unit shall come equipped with a wheel rotation sensor. Alarm contacts will close if the enthalpy wheel stops rotation.

E. External Finish

1. Unit shall include grey, series 8,000, baked on, polyester pre-painted galvanized steel package. Cabinet shall withstand 10 years of exterior exposure without cracking, chipping, peeling, brazing or spotting.

- F. Outside Air Damper
 - 1. Unit shall include an insulated, motorized outside air damper.
- G. Exhaust Air Damper
 - 1. Unit shall include an insulated, motorized exhaust air damper (low leak).
- H. Door Fasteners
 - 1. Unit shall include deluxe blower door and filter door with polyamide handles and 1/4 turn fasteners.
- I. External Disconnect
 - 1. Unit shall come equipped with a Nema 4 non-fused disconnect with single power point connection.
- J. Hoods (roof mounted units)
 - 1. Roof mounted units shall include intake and exhaust hoods.
- K. Supply Discharge
 - 1. Unit shall include bottom or end supply discharge.
- L. Return Air
 - 1. Unit shall include bottom or end return air.
- M. Filtration
 - 1. Unit shall include supply and exhaust filters, Disposable, 2 inches thick, high efficiency with an 85% DSE rating.
- N. Free Cooling
 - 1. Unit shall come equipped with a factory installed thermostat (drybulb) to control free cooling on a call for cooling via the room thermostat.
- O. Energy Recovery
 - 1. Enthalpy wheel shall come complete with a purge section to minimize carry over of exhaust air contaminates from wheel rotation.

2.04 ACCESSORIES

- A. Duct-Mounted Smoke Sensor
 - 1. Unit shall include a duct-mounted smoke sensor controller for field installed control of fan operation.

- B. Temperature Controller - Single Stage
 - 1. Unit shall include a single pole double throw, automatic reset temperature controller for field installed control of on/off operation.
- C. Roofcurb (roof mounted units)
 - 1. Roof mounted units shall include an insulated roofcurb.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive heat recovery ventilators for compliance with requirements for installation tolerances and other conditions affecting performance of heat recovery ventilators. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install heat recovery ventilators as indicated, according to manufacturer's written instructions.

3.03 CONNECTIONS

- A. Ducts and fan installation requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of piping, fittings, and specialties.
- B. Ground equipment.
 - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect and clean exposed finishes. Remove dirt and construction debris and repair damaged finishes.

3.05 COMMISSIONING

- A. Startup Services: Engage a factory-authorized service representative to commission units as specified below.
 - 1. Energize and verify correct rotation of fans.
 - 2. Adjust seals and purge.
 - 3. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

4. Test and Balance units to deliver air quantities indicated on the project drawings. Document all readings and adjustments i.e cfm, static pressure, etc.. Provide six copies of Test and Balance report. Delivered air quantities to be within 5% of project drawing listed quantity.

3.06 DEMONSTRATION

- A. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
- B. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Contract Closeout."
- C. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

3.07 WARRANTY

- A. Unit shall have a 2 year warranty on all parts not including the enthalpy wheel assembly.
- B. Enthalpy wheel shall have a 5 year unconditional warranty. Manufacturers without a 5 year warranty shall provide a degradation report each year for 5 years and give a full report to the owner. Alternatively, the manufacturer must supply an additional enthalpy wheel(s) to cover the length of the warranty.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15890 - DUCT CLEANING

PART 1 - GENERAL

1.01 SUMMARY

Section includes:

1. Removal and disposal of visible dirt, debris, and other contaminants.
2. Cleaning and decontamination of all supply, return and exhaust ductwork, diffusers, grilles and registers.
3. Chemical pressure washing and decontamination of all heating and cooling coils.
4. Cleaning and decontamination of dampers, supply air fans, exhaust air fans and other components of the HVAC systems.
5. Removal, disinfection, and/or sealing the supply duct lining if applicable with an anti-fungicidal coating as specified in the project drawings.
6. Verification and updating of working drawings.

1.02 SUBMITTALS

- A. Product data for each product specified in this section.
- B. Material safety data sheets for all products used.
- C. Project Record Documents:
 1. Upon completion of the project, submit one set of red-marked, duct layout drawings showing the location of all new access openings installed in the duct systems to accommodate the cleaning process.
- D. Qualifications, schedules and reports:
 1. Qualification and experience documentation
 2. Project schedule and procedures
 3. Final report (3 copies)
 4. Product-Data:
 5. Submit manufacturer's data sheets, including Material Safety Data Sheets (MSDS) if applicable, for the following:
 - a. Air-tight plastic closure plugs
 - b. Vacuum cleaning machines and/or cleaning related equipment and accessories
 - c. Biocide sanitizing fluid
 - d. Anti-fungicidal duct work sealant
 - e. Others as applicable

1.03 QUALITY ASSURANCE

- A. All work in this section shall be performed by an independent specialty HVAC duct-cleaning contractor. The contractor shall be certified by NADCA (National Air Duct Cleaners Association). Submit information indicating qualifications and experience.
- B. Conform to NFPA 90A.

- C. Conform to the requirements of the following standards that do not conflict with regulatory requirements or requirements of the contract documents:
 - 1. SMACNA "HVAC Duct Construction Standards, Metal and Flexible."
 - 2. NADCA "General Specifications for the Cleaning of Commercial Heating and Ventilation Systems."
- D. Factory-Made Products - Listed by Underwriters Laboratories, Inc. (UL).
- E. Video/photographic documentation before and after the cleaning process.
- F. EPA registration for fungicide coating.
- G. A project closing report shall be submitted upon completion of the entire cleaning project. Report shall include a dated summary of the duct systems and HVAC unit inspections and approvals by the Owner's designated representative. Project closing report shall be bound, neatly presented and organized according to HVAC unit, duct system or fan. Also include photographic documentation (min. 3" x 5" color prints) of before and after conditions of each system component or section.

1.04 FIELD MEASUREMENTS

- A. Field measure related work to ensure proper fit and clearance.
- B. Field measure existing work to ensure proper fit and clearance.

PART 2 - PRODUCTS

2.01 DUCT ACCESS PATCHES

- A. Premanufactured sheet metal patches that are crossbroke, hemmed and predrilled, with insulation to match ductwork.

2.02 DUCT ACCESS DOOR

- A. Premanufactured insulated access door with locking seal. Install at all coils, fans and equipment.

2.03 DUCT SEALER

- A. Product specifically rated for sealing ductwork meeting NFPA requirements.
- B. Seal modifications to existing ductwork in accordance with duct sealing described in SMACNA "HVAC Duct Construction Standards, Metal and Flexible."

2.04 HVAC DISINFECTANT/CLEANER

- A. EPA registered formula for disinfection and cleaning of HVAC equipment equal to Foster Products 40-80.
- B. Stabilized chlorine dioxide - Oxine or approved equivalent.

2.05 FUNGICIDAL PROTECTIVE COATING

- A. EPA registered polyacrylate emulsion specifically formulated for long-term fungicidal activity and HVAC application. Equal to Foster Products 40-20.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine elements and surface intended to support products.
- B. Verify that each product conforms to regulatory requirements and to specification requirements.
- C. Correct any unsatisfactory conditions before installing products of this section.

3.02 EQUIPMENT

- A. HEPA filtered vacuum collector system capable of maintaining up to 1.0 inch of static pressure inside the isolated area of ductwork.
- B. HEPA filtered wet/dry vacuums.
- C. Air compressor as required.
 - 1. The specific air or water pressure selected by the Contractor for air or water washing of various HVAC system components shall be appropriate to the item and component being washed. Water pressure utilized shall not exceed 1,000 psig.
 - 2. Contractor shall repair or replace any system component damaged as a result of using excessive air or water pressure.
- D. Rotary brush system for mechanical cleaning of ductwork.

3.03 PREPARATION

- A. The location of each access opening shall be shown and identified with a red-marked on a blue-lined print of the duct system layout drawings by duct cleaning contractor.
- B. Air volume control devices.
 - 1. Damper and any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must be restored to their marked position.
- C. Seal off ends and openings of any ductwork not being immediately worked on.
- D. Isolate duct section to be worked upon, by using Protective seal barriers within the ductwork, to prevent loose dirt and debris from migrating to cleaned sections of the duct system.

- E. Protect surrounding elements from damage and disfigurement resulting from work of this section.
- F. Synthetic filter media (one inch thick 30% efficiency), or approved other, shall be temporarily fitted over each register, grille and diffuser in the duct system to intercept any migrating loose dirt and debris.
- G. Each work area shall: be protected from being soiled with polyethylene plastic sheet. A protective sheet shall cover all furniture in each room of the work area. Furniture, in the case of laboratory rooms, shall, include all laboratory benches, fume hoods, desks, and related laboratory equipment. Upon completion of the duct system cleaning in each work area, protective sheeting shall be carefully removed with collected dirt and debris disposed of in an approved manner. Vacuum clean floors and other areas in each room restoring each room to its original clean condition.
- H. Suitably support and brace any ductwork, which will be entered by personnel.
- I. Any person entering the ductwork must have confined space training.

3.04 SEQUENCE OF CLEANING AND DECONTAMINING DUCTS

- A. All work shall be conducted during unoccupied times and shall be coordinated with the designated owners' representative.
- B. Take the fans off energy scheduling and allow them to run 24 hours except when the ductwork is being cleaned.
- C. Clean the outside air intake grille and shaft.
- D. Clean the return air ducts starting at the outer ends of the return air system and concluding at the mixed air chamber and the exhaust stack.
- E. Clean the interior of the air handling unit.
- F. Install products in compliance with manufacturer's instructions.
- G. Pre-vacuum diffusers, grills and registers in the ductwork. If necessary, remove, chemically wash/clean and reset (not required for existing diffusers to be replaced).
- H. Existing ductwork and insulation shall be neatly cut as required to provide access to facilitate cleaning of the ductwork and components. As necessary, protect downstream areas from receiving particulates during the installation of access points.
- I. Install vacuum collector unit at a predetermined location and clean the section of ductwork using omnidirectional air nozzles and rotary brushes as necessary. Large crawlable ducts may be hand vacuumed or brushed and air washed.
- J. Clean the supply ductwork starting from the supply fan and ending at the supply diffuser. At no point should uncleaned ductwork be upstream from clean ductwork.
- K. The Owner's designated representative shall approve location of access openings.
- L. Existing duct access panels shall be used wherever possible.
- M. Upon completion of the cleaning operation, the round access openings shall be plugged air-tight with plastic caps designed for this purpose.
- N. The rectangular access openings shall be closed using an overlapping galvanized sheet metal, or material to match existing ductwork, cover (cross broken) of the same gauge thickness as

existing duct. Rectangular cover shall be fastened using self-tapping sheet metal screws with a silicone bead sealing gasket; or 3M No. 1202-T sealant tape used as a sealing gasket, at perimeter of cover. Seal all joints air-tight.

- O. Where ducts are provided with exterior insulation, neatly cut and remove insulation as required to accommodate required duct access openings. When complete, reinsulate at ducts at access points and install new vapor barriers to match existing.
- P. Visually inspect the duct interior prior to cleaning each duct section. Use a fiber-optic borescope to accomplish the inspection task for all smaller ducts not otherwise accessible.
- Q. Wash and vacuum clean each duct section:

Lined Ducts: Air pressure wash and vacuum or rotary brush and vacuum. The cleaning process shall not degrade the insulation. Damaged insulation will be replaced or repaired at the discretion of the owners Representative.

- 1. Fog the interior of the ductwork with Oxine and allow to dry.
- 2. Upon completion of the cleaning of each lined duct section, seal the surface of the lined duct with Foster 40/20 or an approved white encapsulant equivalent.

Unlined Ducts: Air pressure wash and vacuum or rotary brush and vacuum. Hand wipe or hand vacuum if space allows. Fog the interior of the ductwork with Oxine and allow to dry.

- R. Visually inspect each duct section using a borescope where necessary, to ensure the duct section is clean.
- S. All registers, grilles and diffusers shall be removed, vacuum cleaned, washed and then reinstalled.
- T. Clean ceiling around all registers, grilles and diffusers.
- U. After duct section and reheat coils have been completely cleaned and sanitized, a final visual inspection, using a fiber-optic borescope as required, shall be accomplished with the Owner's designated representative for conditional approval. At this time, an owners' representative will take samples for mold contamination. The cleaning will receive final approval if the total fungal counts on a surface Rodac plate sample taken from the surface of the duct do not exceed 50 colony forming units on any plate. Verbal confirmation of the clearance surface sampling results will be given seven days after the final surface sample results are taken. If the desired cleaning effectiveness is not achieved, the area will have to be re-cleaned by the Contractor. The results of the cleaning effectiveness will be included in the final report. The cleaning contractor shall provide all ladders, lighting, fiber-optic borescope, and other miscellaneous equipment required to permit the owner's representative to inspect all portions of the project.
- V. Repeat the cleaning process described above for succeeding duct sections until entire duct system is completely clean.
- W. Verify that the building's air supply and return system is properly balanced.

- X. Duct Access Doors:
 - 1. A certified sheetmetal worker shall install all duct access doors.
 - 2. Install duct access doors on the side of duct where adequate clearance is available.
 - 3. Install duct access doors at other locations requiring access to duct interior for inspection, cleaning, adjusting, maintenance and operation.
 - 4. Size: 18 inches by 16 inches unless duct is too small for this size.
- Y. Install duct test holes as required.

3.05 CLEANING HVAC EQUIPMENT

- A. Isolate HVAC unit housing from adjacent equipment and building room surfaces with polyethylene sheet.
- B. Protect all motors, bearing assemblies, and belt drive assemblies within the HVAC unit housing with taped-on polyethylene sheet to prevent intrusion of potentially damaging wash water.
- C. Remove filters/filter media from holding frames and dispose of in an approved manner. Install new filter media after cleaning operation is complete, in accordance with filter manufacturer's instructions to insure a leak-free installation. Do not restart fans until all filters have been installed and inspected by owner representative.
- D. Vacuum clean entire internal space of HVAC unit, including each component including component supports, frames, mounts, etc. contained therein, to remove loose dirt and debris.
- E. Pressure wash, using an EPA approved cleansing agent, each HVAC unit. This shall include all the internal surfaces of the HVAC unit housing and all the internal components of the HVAC unit including fans, cooling and heating coil banks, filter bank support frames, and contiguous control damper assemblies.
- F. Pressure washing of the heating and cooling coil banks shall be accomplished at both the upstream and downstream faces of the coils.
- G. Where deemed necessary by the Cleaning Contractor, cleansing agent solution may be separately supplied prior to pressure wash.
- H. Hand scrub where required to remove all residual dirt.
- I. Rinse thoroughly with clear water to remove any residual dirt and cleansing agent.
- J. Fan casings and impeller wheels shall be cleaned on all surfaces, inside and outside.
- K. Vacuum clean all pressure washed surfaces. Vacuum collected wash water shall be disposed of outside of the HVAC unit.
- L. A visual inspection of the HVAC unit, including all of its internal components shall be performed by the Owner's designated representative together with the Cleaning Contractor. At this time, an owner designated representative will take samples for mold contamination. The cleaning will receive final approval if the total fungal counts on a surface Rodac plate sample does not exceed 50 colony forming units on any plate. If the desired cleaning efficiency is not achieved, the area will have to be re-cleaned by the Contractor. Include this data in the final report.

3.06 APPLICATION OF FUNGICIDAL PROTECTIVE COATING

- A. Apply fungicidal protective coating as per manufacturer's instructions with the HVAC system on interior fiberglass insulation that was previously cleaned and disinfected.
- B. Do not coat coils, filters, controls or fans.
- C. If the interior of a VAV box is encapsulated, the controls on the box must be protected from the encapsulant. The performance of the box must not be compromised by the duct cleaning.

3.07 FIELD QUALITY CONTROL

- A. Inspect installed products to observe damage.
- B. Test and demonstrate as required by the governing authority.
- C. Do not allow discharge air from the fungicidal coating process to enter occupied spaces.
- D. Ceiling and wall surfaces that are damaged by this work shall be replace or repaired as required.
- E. Restore to marked position all dampers and any air directional mechanical devices.
- F. Final Purge.
 - 1. Work Area Preparation
 - a. Cover all terminal air outlets (diffusers, registers, grilles, etc.) with synthetic filter media at least 30% efficient. Tape filter to terminal device frame to eliminate air leakage.
 - 2. Purge Procedure
 - a. Inform Owner's designated representative that outlets have been covered with synthetic filter media at least 30% efficient.
 - b. Insure all filters have been properly installed.
 - 3. After receiving verbal confirmation about attainment of proper cleaning efficiency from an owner representative start HVAC units and in the event of variable speed/volume systems operate unit up and down between low and high speed to dislodge dirt and debris. Perform purge operation continuously for minimum of 1 hour.
 - 4. Clean-Up:
 - a. Remove synthetic filter media from air terminal outlets, and wash and dry outlet frame with approved cleaning solution.
 - b. Vacuum and clean work areas to original condition.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15891 - DUCTWORK

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Extent of ductwork is indicated on drawings and by requirements of this section.
- B. Types of ductwork required for project include the following:
 - 1. Heating supply and return air systems.
 - 2. Air conditioning supply and return air systems.
 - 3. Fresh air supply systems.
 - 4. Mechanical exhaust systems.
 - 5. Air relief systems.
 - 6. Fume hood exhaust systems.
 - 7. Wood shop exhaust system.
- C. Specific Duct System Classifications:

<u>Service</u>	<u>Material</u>	<u>Pressure Class</u>	<u>Velocity</u>
HVAC Supply	Galvanized Steel	2" WG	2500 FPM
Return Relief Exhaust	Galvanized Steel	1" WG Negative	1500 FPM
Air Plenums	Galvanized Steel	2" WG	2500 FPM
Fume hood	Stainless Steel	4" WG Negative	4000 FPM
Woodshop	Galvanized Steel	5" WG Negative	3000 FPM

- D. External insulation for ductwork is specified in Division 15 insulation sections, and is not included as work of this section.
- E. Duct accessories are specified in Division 15 Section and are included as work of this section.
- F. Inlets and outlets are specified in Division 15 section and are included as work of this section.
- G. Duct lining, as specified herein and indicated on drawings, is included as work of this section.

1.02 SUBMITTALS

- A. Product data: Submit manufacturer's specifications on manufactured products and factory fabricated ductwork, used for work of this section.
- B. Shop drawings: Submit dimensioned layouts of ductwork showing both the accurately scaled ductwork and its relation to space enclosure. Duct dimensions shall be external and provide adequate space to include lining and maintain internal dimensions

indicated on contract drawings. When appropriate, show modifications of indicated requirements made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.

- C. As-Built drawings: At project closeout, submit as-built drawings of installed ductwork, duct accessories, and outlets and inlets, in accordance with requirements of Division 1.

1.03 QUALITY ASSURANCE AND REQUIRED CODES AND STANDARDS

- A. SMACNA standards (metal and flexible ductwork) - comply with SMACNA "HVAC Duct Construction Standards" latest edition for fabrication and installation of metal and flexible ductwork.
- B. SMACNA standards (thermoplastic duct) - comply with SMACNA "Thermoplastic Duct (PVC) Construction Manual" latest edition for fabrication and installation of thermoplastic (PVC) ductwork.
- C. SMACNA standards (fibrous glass ductwork) - comply with SMACNA "Fibrous Glass Duct Construction Standards" latest edition for fabrication and installation of fibrous glass ductwork.
- D. SMACNA standards (industrial duct) - comply with SMACNA "Accepted Industry Practice for Industrial Duct Construction"; "Accepted Industry Practice for Round Industrial Duct Construction"; and "Accepted Industry Practice for Square Industrial Duct Construction", latest editions, for fabrication and installation of industrial ductwork.
- E. SMACNA standards: Comply with SMACNA "Duct Liner Standards" for installations of duct liner in sheet metal ductwork.
- F. NFPA compliance: Comply with NFPA 90 A "Standard for the Installation of Air Conditioning and Ventilating Systems."

1.04 DELIVERY, STORAGE AND HANDLING

- A. Protect shop fabricated and factory fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.
- B. Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.01 DUCTWORK MATERIALS

- A. Exposed ductwork materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, oil canning, stains and discolorations, and other imperfections, including those which would impair painting.

- B. Sheet metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ANSI/ASTM A 527, lockforming quality, with ANSI/ASTM A 525, G90 zinc coating, mill phosphatized for exposed locations.
- C. Flexible Duct - Polyethylene Vapor Barrier Type. Where indicated, provide insulated flexible duct as follows:
1. Galvanized steel helix, formed and mechanically locked to fabric.
 2. Aluminum foil trilaminate, fiberglass and aluminized polyester, mechanically locked (no adhesive).
 3. Exterior fiberglass insulation blanket factory wrapped. Thermal conductance, C factor, not more than 0.23.
 4. Outer jacket of gray fire retardant polyethylene material.
 5. UL listed per UL 181, Class 1 Air Duct.
 6. Operating temperature range -20 degrees to 250 degrees F.
 7. Flame spread less than 25, smoke developed less than 50.
 8. Working pressures:
 - a. 6 inch w.g. positive (all diameters).
 - b. 4 inch w.g. negative, through 16 inch diameters.
 - c. 1 inch w.g. negative, 18 to 20 inch diameters.
 9. Rated velocity: 4,000 FPM.
 10. Manufacturer:
 - a. Flexmaster, Type 3.
 - b. Clevaflex USA, Inc.
 - c. Thermaflex.
- D. Flexible Duct Fittings: Provide factory manufactured galvanized steel fittings. Use 45 degree laterals, ball mouth tees, spin collars, or conical tees for duct taps. 90 degree tees shall not be allowed.

2.02 DUCT LINER

- A. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.
1. Manufacturers:
 - a. CertainTeed Corp.; Insulation Group.
 - b. Johns Manville International, Inc.
 - c. Knauf Fiber Glass GmbH.
 - d. Owens Corning.
 2. Materials: ASTM C 1071; surfaces exposed to air stream shall be coated to prevent erosion of glass fibers.
 - a. Thickness: 2 inches.
 - b. Thermal Conductivity (k-Value): 0.26 at 75°F (0.037 at 24°C) mean temperature.

- c. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
- d. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
- e. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - 1) Tensile Strength: Indefinitely sustain a 50-lb- (23-kg) tensile, dead-load test perpendicular to duct wall.
 - 2) Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch (3 mm) into air stream.
 - 3) Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.03 MISCELLANEOUS DUCTWORK MATERIALS

- A. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.
- B. Duct sealant: Non-hardening, non-migrating mastic elastic sealant (type applicable for fabrication/installation detail) as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork. Liquid allowed for slip joints only. Silicone base duct sealer shall be used on duct joints exposed to weather.
- C. Ductwork support materials.
 - 1. For galvanized steel ductwork, provide hot dipped galvanized steel fasteners, anchors, rods, straps, trim and angles.
 - 2. For stainless steel ductwork, provide matching stainless steel support materials.
 - 3. For flexible ductwork, provide hot dipped galvanized steel support material.
- D. Duct Connector: Where duct system meets or exceeds pressure class of 2" w.g., positive or negative, incorporate the use of rolled, formed, machine manufactured duct connector.
 - 1. Manufacturer: Subject to compliance with requirements, provide duct connector of one of the following:
 - a. Ward.
 - b. Ductmate.
 - c. United McGill.
 - d. Flexmaster.

2.04 SHOP FABRICATION

- A. Shop fabricate ductwork in 4, 8, 10 or 12 foot lengths, unless otherwise indicated or required to complete runs. Pre-assemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for re-assembly and coordinated installation.
- B. Shop fabricate ductwork of gages and reinforcement complying with applicable SMACNA standard.
- C. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with inside radius equal to associated duct width. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.
- D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division 15 section "Duct Accessories" for accessory requirements.
- E. Fabricate ductwork with duct liner in each section of duct where indicated. Fabricate ductwork large enough to accept liner of thickness indicated and to maintain inside dimensions shown on contract drawings. Laminate liner to internal surfaces of duct in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners.
- F. Provide lining in all ductwork that is conveying below ambient temperature air and is not insulated. Provide lining in supply air and return air ductwork from air handling unit to 20 feet away from the unit. Provide lining in ductwork as indicated on drawings.

2.05 FACTORY FABRICATED DUCTWORK

- A. General: At Installer's option, provide factory fabricated spiral, round or oval duct and fittings, in lieu of shop fabricated duct and fittings.
- B. Gauge: Tables 3-2 and 3-3 SMACNA "HVAC Duct Construction Standards." No standing rib shall be allowed.
- C. Oval Elbows: 3 gore 90 degree and 2 gore 45 degree with machine formed seam.
- D. Round Elbows: one piece construction for 90 degree and 45 degree elbows 14" and smaller. Provide 5 gore 90 degree and 3 gore 45 degree construction for larger diameter with machine formed seam joint.
- E. Divided flow fittings: 90 degree tees, constructed with saddle tap spot welded and bonded to duct fitting body.
- F. Manufacturer: subject to compliance with requirement, provide factory fabricated ductwork of one of the following:

1. United Sheet Metal Div., United McGill Corp.
2. Semco

PART 3 - EXECUTION

3.01 INSTALLATION OF DUCTWORK

- A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight (5% leakage) and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling.
- B. Duct Sizing: Duct sizes indicated on drawings are inside dimensions.
- C. Flexible Duct: Flexible duct may be used for connecting room diffuser to sheet metal duct and/or ceiling terminal box only. Extend flexible duct completely and limit lengths to five feet (5'), or as indicated on Drawings. Support according to SMACNA.
- D. Seal ductwork to seal class as prescribed in SMACNA "HVAC Duct Construction Standards" for the static pressure classes indicated, unless otherwise recommended.
- E. Complete fabrication of work at project as necessary to match shop fabricated work and accommodate installation requirements.
- F. Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.
- G. Electrical equipment spaces: Do not run ductwork through transformer vaults and their electrical equipment spaces and enclosures.

- H. Boiler Rooms: Do not run ductwork through boiler rooms unless protected per NFPA requirements.
- I. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct-plus insulation with sheet metal flanges of same gage as duct. Overlap opening on four sides by at least 1-1/2".
- J. Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- K. Support ductwork in manner complying with appropriate SMACNA standard.

3.02 INSTALLATION OF WOODSHOP EXHAUST (N/A)

3.03 APPLICATION OF LINER IN RECTANGULAR DUCTS

- A. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
- B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
- C. Butt transverse joints without gaps and coat joint with adhesive.
- D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
- E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.
- F. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm (12.7 m/s).
- G. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.
- H. Secure transversely oriented liner edges facing the airstream with metal nosing's that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - 1. Fan discharges.
 - 2. Intervals of lined duct preceding unlined duct.
 - 3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm (12.7 m/s) or where indicated.

- I. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used; secure buildouts to duct walls with bolts, screws, rivets, or welds.

3.04 CLEANING AND PROTECTION

- A. Clean ductwork internally, unit-by-unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.
- B. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.
- C. Temporary closure - at ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

3.04 BALANCING

- A. Refer to Division 15 Section 15990 "Testing, Adjusting and Balancing" for air distribution balancing of ductwork. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15893 - DUCT ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Extent of duct accessories work is indicated on drawings and in schedules, and by requirements of this section.
- B. Types of duct accessories required for project include the following:
 - 1. Fire and smoke dampers(in compliance with NFPA80-STD for opening protectives)
 - 2. Access doors
 - 3. Turning vanes
 - 4. Manual Dampers
 - a. Butterfly manual dampers
 - b. Opposed-blade manual dampers
 - 5. Intake/Exhaust dampers
 - 6. Flexible connections

1.02 SUBMITTALS

- A. Product data - submit manufacturer's specifications for each type of duct accessory, including dimensions, capacities, and materials of construction, and installation instructions.
- B. Shop drawings - submit assembly type shop drawings for each type of duct accessory showing interfacing requirements with ductwork, and method of fastening or support.
- C. Maintenance data - submit manufacturer's maintenance data including parts lists for each type of duct accessory, include this data in Maintenance Manual.

1.03 QUALITY ASSURANCE

- A. SMACNA compliance - comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) high pressure and low pressure duct construction standards.
- B. Industry standards - comply with American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to construction of duct accessories, except as otherwise indicated.
- C. UL compliance - construct, test and label fire dampers in accordance with Underwriters Laboratories (UL) Standard 555 "Fire Dampers and Ceiling Dampers".

- D. NFPA compliance - comply with applicable provisions of ANSI/NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of duct accessories.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver components with factory installed packing and protective containers.
- B. Handle components carefully to prevent damage to components and finish. Do not install damaged components; replace with new.
- C. Protect components from weather, dirt, construction traffic and debris, etc.

PART 2 - PRODUCTS

2.01 FIRE AND SMOKE DAMPERS

- A. Standards, Fire and Smoke Dampers: Conform to the requirements of NFPA 90A and UL listed, labeled and rated 1-1/2 hours, and in compliance with NFPA80-STD for opening protectives. Provide fusible links 165 degrees F., vibration proof and secured with clinched "S" hooks or stainless steel bolts and lock nuts.
- B. Smoke Dampers: Conform to UL, fit with control shafts for operation by electric or pneumatic motors. Provide a 165 degrees F thermal link.
- C. Access Doors: Provide adjacent to all fire and smoke dampers.
- D. Manufacturer: Subject to compliance with requirements, provide products by one of the following.
 - 1. Ruskin Mfg. Co.
 - 2. Controlled Air, Inc.

2.02 ACCESS DOORS

- A. Standard: Conform to SMACNA.
- B. Location: Provide access doors in casings, plenums and ducts where shown on Drawings and where specified for ready access to operating parts including fire dampers, smoke dampers, valves, and concealed coils.
- C. Pressure Classification: Construct and install access doors in accordance with SMACNA Standards to suit the static pressure classifications and the locations where installed.
- D. Access Doors in Ducts: Provide and size doors as follows.
 - 1. Minimum 24-inch by 24-inch clear opening.
 - 2. When field conditions require an access opening smaller than 16-inch by 12-inch, provide a 24-inch long removable

section of casing or duct, secured with quick acting locking devices, 6 inches on centers, to permit ready access without dismantling other equipment.

- E. Door Requirements: Provide doors in casings and duct as follows.
 - 1. Arrange doors so that system air pressure will assist closure and prevent opening when the system is in operation.
 - 2. Coordinate doors and equipment to provide unrestricted passage through clear door opening, without removal of any equipment.
 - 3. Where pressure regulating dampers are installed in ducts or plenums, provide access doors with a clear wire glass observation port, 6-inch by 6-inch minimum size. Anchor port with structural metal frame, resilient gaskets and stainless steel bolts.
- F. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.
 - 1. Ruskin Mfg. Co.
 - 2. Flexmaster USA, Inc.
 - 3. Ductmate Ind., Inc.
 - 4. United McGill Corp.

2.03 TURNING VANES

- A. Acoustic Turning Vanes: Construct of airfoil shaped aluminum extrusions with perforated faces and fiberglass fill.
- B. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.
 - 1. Air Filter Corp.
 - 2. Anemostat Products Div., Dynamics Corp. of America.
 - 3. Duro-Dyne Corp.
 - 4. United McGill Corp.

2.04 MANUAL DAMPERS

- A. Provide dampers of single blade (butterfly) type, constructed in accordance with SMACNA Duct Standards.
- B. Provide dampers of multiple, opposed-blade type, constructed in accordance with SMACNA Duct Standards.
- C. Bearings: Two piece molded synthetic.
- D. Axles: 1/2" plated steel hew.
- E. Control Shaft: 1/2" diameter.
- F. Finish: Mill.

- G. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.
1. Ruskin Mfg. Co.
 2. Controlled Air, Inc.
 3. United McGill Corp.

2.05 INTAKE OR EXHAUST DAMPERS

- A. General: Provide low leakage, airfoil dampers; opposed blade arrangement; AMCA rated 6 CFM/sq. ft. at 4" w.g.
- B. Construction
1. Frame: 6063T5 extruded aluminum hat channel 0.125 wall thickness 5" x 1" (5" x 1/2" top and bottom 12" high or less).
 2. Blades: 6" wide 6063T5 heavy gage extruded aluminum airfoil shape with extruded metal (aluminum) jam seals.
 3. Linkage: Concealed.
 4. Operators: Control operators specified under "Controls" Section, and is work of Division 15.
- C. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.
1. Construction Specialties, Inc.
 2. Ruskin Mfg. Co.
 3. Arrow United Industries, Inc.

2.06 FLEXIBLE CONNECTIONS

- A. Fans: Provide flexible connections between fans and ducts or casings where indicated on the Drawings or required to accommodate expansion and vibration.
- B. Material: Construct connections of cotton duck, minimum 20 ounces per square yard.
- C. Elevated Temperature: For temperatures in excess of 100 degrees F., and corrosive, acid alkali or garage exhausts use close woven glass cloth, double neoprene coated, minimum 28 ounces per square yard.
- D. Length: Limit flexible connections to 4-inch active length in the direction of airflow.
- E. Standard: Construct in accordance with SMACNA Standards.
- F. Attachment: Attach to fans, casings and ductwork as specified by manufacturer.
- G. Manufacturer: Subject to compliance with requirements, provide products by one of the following manufacturers.
1. Vent Fabrics, Inc. or equal.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which duct accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install duct accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
- B. Install turning vanes in square or rectangular 90 degree elbows in supply and exhaust air systems, and elsewhere as indicated.
- C. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter.
- D. Coordinate with other work, including ductwork, as necessary to interface installation of duct accessories properly with other work.
- E. Field quality control - operate installed duct accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15895 - DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Scope: Extent of air diffuser and register work required in this Section is indicated on the Drawings and schedules and by the requirements of this Section.
- B. Types required for project include the following:
 - 1. Ceiling air diffusers.
 - 2. Wall and duct registers and grilles.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's standard technical product data including capacity ratings, throw, drop, diffusion, terminal velocities, noise levels, adjustability, construction details, finish and mounting details.
- B. Shop Drawings.
 - 1. Provide dimensioned shop drawings of linear diffuser mounting, plenum dimensions, plenum connections, damper connections and branch ductwork connections.
 - a. Draw shop drawings showing plans, sections, mounting details and finishes.
 - b. Furnish certified test data, including acoustical performance of the air troffer/boot combination with maximum air quantities indicated on the drawings.
- C. Schedule: Submit a schedule of proposed air diffusers, registers and grilles, keyed to the Contract Drawings and indicating the proposed type, size, air quantity, pressure drop and location of each device proposed under this Contract.
 - 1. Manufacturer: Same for all diffusers and registers on project.

1.03 QUALITY ASSURANCE

- A. ASHRAE: Test and rate air outlets and inlets in certified laboratories under the requirements of ASHRAE Standard 70.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Original Containers: Deliver air diffusers and registers to the site in manufacturer's original containers. Identify on outside of container type and location to be installed.

- B. Protect From Damage: Do not install bent, marred or damaged devices. Replace with new. Store indoors, where possible, or outdoors in weatherproof enclosures above grade.

PART 2 - PRODUCTS

2.01 AIR DIFFUSERS AND REGISTERS: GENERAL

- A. Construction: Provide devices as specified on drawings.
1. Treat steel with zinc phosphate or zinc chromate after fabrication.
 2. Grind, polish and factory prime.
 3. Factory finish with white baked enamel finish, unless otherwise indicated.
 4. Roll or reinforce exterior faces and edges.
 5. Ensure mitered joints and butt connections mate within 0.010-inch maximum crack.
 6. Surface finish: Smooth within 0.005-inch at welds, joints, clamping points and splices.
 7. Offsets and bends: Mitered.
 8. Mate devices with the associated duct, plenum or boot to form an airtight joint.
- B. Provide as scheduled on Drawings.

2.02 SUPPLY OR RETURN REGISTERS

- A. Register Type: Adjustable single or double-deflection type, formed steel or extruded aluminum, as indicated on the Drawings; noise levels of NC 20 or less.
- B. Bars: Provide adjustable or fixed face bars and fixed rear bars, as indicated by types on Drawings.
- C. Frames: Provide stamped or rolled steel or extruded aluminum frames fitted with felt, neoprene or plastic gaskets.
- D. Dampers: If indicated on drawings provide register dampers of formed steel, cadmium plated, gang key operated, opposed blade type, and arranged so that the operating mechanism does not project through any part of the register face.
- E. Mounting Hardware: Provide round or countersunk head Phillips screws.
- F. Air Extractors: Provide 18 gage frames, 22 gage curved steel blades, fixed pattern, screwed to the duct collar, and sized to match register dimensions.
- G. Manufacturer: Subject to compliance with requirements, provide registers of one of the following:
1. Titus Products.
 2. Anemostat Products Division, Dynamics Corp.
 3. Carnes Co., Division of Wehr Corp.

2.03 RETURN GRILLES

- A. Construction: Construct as specified for registers, except omit register damper.
- B. Bars: Provide fixed horizontal face bars with 1/2-inch spacing and 35 degree downward blade angle.
- C. Filters: If indicated on drawings provide 1-inch throw-away filters for return grilles.
- D. Manufacturer: Subject to compliance with requirements, provide grille units of one of the following:
 - 1. Titus Products.
 - 2. Anemostat Products Division, Dynamics Corp.
 - 3. Carnes Co., Division of Wehr Corp.

2.04 CEILING DIFFUSERS

- A. Ceiling Diffusers: Provide circular, square or rectangular, as indicated on the Drawings; noise levels as indicated on drawings.
- B. Diffuser Edge and Framing Details: Compatible with the type of ceilings in which the diffuser is installed. For plaster ceiling provide plaster frames or plaster rings, set flush with finished ceiling.
- C. Materials: Refer to drawings.
- D. Access: Provide removable internal parts of circular, square or rectangular diffusers, including volume regulators, diffuser face, dampers and equalizing devices.
 - 1. Allow removal of parts, including internal assembly, without the use of special tools.
 - 2. Do not allow removal of diffuser face to disturb the distribution pattern.
- E. Finish: Provide baked enamel finish on visible face. Coordinate color with Architect.
 - 1. Interior and concealed parts: Flat black or dark gray.
- F. Adjustable Pattern: Provide adjustable pattern diffuser cones to vary the distribution from horizontal parallel to the ceiling to a downward distribution pattern into the space, not on exposed face.
- G. Pressure Range: Design to allow equal distribution pattern, both horizontal and vertical, for diffusers with pressure drops from 0.10 to 0.40 inches water gage.
- H. Dampers, Diffusers, and Extractors: Products of the same manufacturer.

- I. Extractors: Provide adjustable extractors, furnished by the diffuser manufacturer, in each ceiling diffuser where indicated on drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Coordination: Coordinate the location of grilles, registers and diffusers with other trades. Examine areas and conditions under which inlets and outlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.
1. Examine architectural floor plans, reflected ceiling plans and elevations and arrange for duct taps to be so placed that the installation of air outlets will present a uniform relationship with architectural features, lighting, sprinkler heads, speakers and smoke detectors.
 2. On plain walls, if not otherwise indicated, locate sidewall registers approximately 8 inches down from the finished ceilings.
 3. Adjust the face and rear bars of supply registers to provide a diffusion pattern such that the terminal velocity point is approximately 70 percent of the "room" width and 5 to 6 feet above the finished floor, at a velocity of 20 to 50 fpm.
 4. On projects with reflected ceiling plans, locate outlets to conform to that plan.
 5. If no reflected ceiling plans are included in the Contract Documents, coordinate the location of air outlets with other trades before cutting in ceiling and sidewall taps. Provide coordination drawing in shop drawings.

END OF SECTION

Automatic Temperature Control Systems

Section 1 - General Requirements.

A. GENERAL

1. Furnish and install all temperature controls including all devices and accessories required for the installation of a complete Johnson web-based Facility Explorer energy management and control system.
2. All new controls shall be of the DDC type unless specified otherwise. All DDC controls shall be manufactured by Johnson Controls. The design make for the web-based front-end controller is Johnson Controls Facility Explorer LP-FX80; all local DDC controllers is Johnson Controls Facility Explorer PCG/PCA. All new controls shall be networked to this new FX80 controller. The contractor will include all additional licenses as necessary to accommodate the new controls.
3. The contractor shall be authorized by the system manufacturer and shall submit training certificates and current proof that the contractor is a *Johnson Controls Authorized Building Controls Specialist (ABCS)*.
4. Under no circumstances, will the Owner accept bids for DDC systems that are proprietary in nature. If the bidding contractor is including a DDC system other than Johnson FX-80, it must meet all the requirements of this specification and the contractor must list the DDC system in a substitutions list and include the following information with his bid:
 - a. The DDC system they are proposing.
 - b. A list of at least two additional sources for the installation, service and purchase of repair parts within a 50-mile radius of the School District. These sources must be completely independent from the bidding contractor. The intent is to assure the District that they are not entering into a proprietary arrangement.
 - c. Written assurance that the proposed substitute DDC system meets all the requirements of this specification.
5. Control systems shall be complete in all respects, including all labor, materials, equipment and service necessary. The controls shall be of the DDC type unless otherwise specified.
6. Systems shall include, but not be limited to, all application specific controllers, transducers, transformers, cabinets, valves and operators, dampers and operators, relays, sensors, switches and terminals.
7. Systems shall be installed by competent mechanics regularly employed by a company whose primary business is the installation of automatic temperature control systems. The company must employ at least two control specialists who have successfully completed at least one Johnson factory-authorized 5-day training program on the controls specified for this project. The contractor will be required to submit proof of such training in the form of a Johnson Controls Institute Certificate.
8. Installation shall include all control components, installation of all control wiring and pneumatic tubing. All wiring required for interlocking and interfacing controls with the equipment to be controlled, whether low voltage or line voltage; calibration and adjustment of all controls, dampers, linkages, etc is part of this contract.
9. All control wiring concealed in walls or run in open areas of machine rooms shall be in conduit. In other locations, plenum rated cable shall be used.
10. The ATC Contractor shall provide PDF submittal books showing how he proposes to complete the work specified herein. In this book, the ATC Contractor shall submit description of operation and schematic drawings, produced in AutoCAD, showing the wiring and pneumatic tubing of the entire control system to the District for review before starting any work. Bulletins describing each item of control equipment or component shall be included.

11. Upon completion of his work, the ATC Contractor shall provide PDF Operation & Maintenance Manuals showing exactly how each component of the system was installed, specifically noting any changes from the submittal book, and who authorized the change. Schematic drawings, sequences of operation and technical literature must be provided for all components of the system.
12. All automatic temperature control work completed under this Contract shall be covered under a one (1) year warranty and service contract effective on date of acceptance. Scheduled maintenance service shall be provided to attend to the normal maintenance required for proper system operation in the building.
13. It is the Contractor's responsibility to inspect the buildings, their existing systems and the project drawings to verify exact quantities of devices and controls required for the systems specified. No allowance will be made if the Contractor fails to make such an examination.
14. Provide nameplates on all devices, whether or not mounted on the face of the central and local control panels. In occupied areas, nameplates shall be concealed beneath covers of room type instruments, to describe functions.
15. All control panels shall include wire markers for each wire, with an identifying wiring diagram.
16. The Control Contractor shall provide a minimum of two (2) three-hour training classes on the system operation and maintenance. This is to include both classroom and on-site training to ensure that the District's custodial and maintenance personnel have adequate knowledge of the control system's features as well as operation and maintenance requirements. The Contractor will provide printed documentation to all persons attending the training sessions.

B. THERMOSTATS/TEMPERATURE SENSORS

1. Thermostat or sensor locations not shown on the drawings shall be subject to approval of the Architect. All thermostats or sensors sensing temperature within ductwork or at coils are to be provided with elements of sufficient length to measure average temperature across the duct cross section or coil face. DDC space sensors shall have no local setpoint adjustment or override capability. It is the intent to make all adjustments from the front-end.

C. VALVES

1. All automatic control valves shall be fully proportioning unless otherwise specified, quiet in operation, and shall be arranged to fail-safe in either a normally open or normally closed position in the event of power failure. The open or closed position shall be as specified or as required to suit job conditions. Valves shall be capable of operating at varying rates of speed to correspond to the exact dictates of the controller and variable load requirements. Provisions shall be made for valves operating in sequence with other valves or damper operators to have adjustable operating ranges and starting points to provide flexibility of adjustment, sequencing and throttling range.
2. Valves shall be sized by the Contractor and guaranteed to meet the heating or cooling requirements as specified, and as indicated on the drawings. Unless otherwise specified, control valves shall have 125 psig cast iron bodies with flanged connections on valves 2 1/2" or larger. Unless otherwise specified, valve bodies shall have the same pressure characteristics as the piping in which they are installed.
3. No single valve, except zone valves, shall be larger than 2" in size. Where the capacity of equipment to be controlled requires a valve larger than 2", two (2) valves shall be installed in parallel with the smaller valve sized for a maximum of 1/3 of the total capacity.
4. Actuators shall be electronic. They shall be mechanically fail-safe. **Capacitor-based fail-safe actuators are not acceptable.**

D. AUTOMATIC DAMPERS

1. Automatic dampers shall be supplied and sized by the Contractor to properly control the flow of air using methods similar to control valve sizing. The Sheet Metal Subcontractor shall provide required safing to fit the damper into the duct work. The dampers shall be constructed with galvanized blades and frames. Blades shall not exceed 6" in width and shall be provided with special replaceable rubber seals on the blade edges and sides. Blades shall be formed from two spot-welded sheets

for extra strength. Frames shall be channel shaped for strength, and to enclose linkage thus keeping linkage out of air stream.

2. The entire construction shall be such that leakage does not exceed 10 cfm per square foot with 2" of static pressure across the damper.
3. Dampers shall have opposed, or parallel blades as required by the application. The proper linkage shall be furnished to provide equal percentage or linear characteristics as required by the application.

E. CONTROL PANELS

1. All control panels for this project will meet the following requirements **as a minimum**:
 - i. The control panel shall be a fully enclosed cabinet, of baked enamel, steel or aluminum material construction and shall meet the requirements of NEMA 1 enclosures.
 - ii. The panel will have a hinged door with a locking latch.
 - iii. Each component on the front panel shall have an appropriate engraved nameplate fabricated from .062" or .125" thick phenolic material, with engraved permanent lettering. **Stick-on labels are not acceptable.**

F. DDC SYSTEM WIRING

1. All conduit, wiring, accessories and wiring connections required for the installation of the Building Automation System, as herein specified, shall be provided by this Contractor unless specifically shown on the Electrical Drawings under Division 16 Electrical. The contractor shall provide, install and wire all repeaters, terminators as recommended by the BMS manufacturer.
2. All wiring shall comply with the requirements of applicable portions of Division 16 and all local and national electric codes, unless specified otherwise in this section.
3. All control wiring materials and installation methods shall comply with DDC system manufacturer's recommendations.
4. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of this Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by this Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.

G. QUALITY ASSURANCE

1. The District must have assurance that the Contractor has full-time employees that are certified in the specified product line and has the resources within the Contractor's company to meet the requirements of this project.
 - a. As part of the BMS/controls submittal documentation, the Contractor is to supply the name and experience/qualifications of at least full-time six employees the Contractor currently employs. These technicians should have at least five years' experience with the specified product line and in the automatic temperature control field. Employees of sub-contractors, suppliers or distributors are not eligible.
 - b. The contractor will also submit copies of factory-sponsored training certificates of at least three employees certifying they have completed the manufacturer approved certification course on the specified Johnson Controls product line.
2. The Contractor shall be authorized by the system manufacturer and shall submit training certificates and current proof that the contractor is a Johnson *Authorized Building Control Specialist* (ABCS). If the bidding contractor *is not a Johnson Controls ABCS Contractor, the bidding contractor shall*:
 - a. *Provide a letter from the BMS manufacturer stating that the BMS manufacturer is fully supporting the proposed Contractor and their technical capability for the duration of the project and the warranty period, and that the BMS manufacturer is undertaking liability in the event the contractor is unable to complete the project as specified.*
3. The Contractor shall be an independent contractor whose primary business is the engineering, programming, installation/wiring and service of total integrated building management systems.

4. The Contractor shall have a fully staffed facility within a 50-mile radius of the project site supplying complete support and maintenance services available 24 hours-a-day, 7-days-a-week basis.

Section 2 – Sequences of Operation.

1. Front-end

- a. Furnish and install all temperature controls including all devices and accessories required for the installation of a complete Johnson web-based energy management and control system.
 - i. A new Johnson Facility Explorer N4 based FX-80 web-based front-end controller will be installed to provide supervisory control of all new and existing DDC equipment in the building.
 - ii. ***The front-end database will be developed with HTML5, based on Tridium N4 platform, and is not to include any client-side java components. The front-end interface must run as a complete system without the need and use of java on the browser computers used by the Maintenance Personnel. Use of systems that rely on Java are not acceptable.***
 - iii. The new N4 FX-80 controller(s) will be licensed and provided with sufficient capacity to accommodate all equipment, sequences of operation and points lists provided, as well as an additional 20% spare point capacity.
 - iv. The ATC contractor will include providing the front-end controller(s) with a minimum 24-month period of software maintenance, to commence from the date of official BMS training to the Maintenance Personnel.
 - v. This contractor will furnish and install as many FX-80 controllers as required to accommodate all new equipment and maintain 20% spare capacity for future expansion. If the FX-80 controller cannot accommodate the new controls while still maintaining this expansion capability, additional FX-80 controllers and dedicated FX-Server with Server PC shall be provided at no additional cost to the owner. ***The contractor will be required to demonstrate this front-end capacity during training and in the O&M documentation.***
 - vi. The Contractor will provide schedules for all equipment, zoned by different areas of the building as designated by the Owner. Providing a separate dedicated schedule for each piece of equipment is not acceptable unless specifically directed by the Owner.
 - vii. This contractor will provide a graphical floor plan of the entire building, with links to all DDC controlled equipment. Upon completion of this project, all DDC controlled equipment will be one seamless DDC front-end with graphical interface for each piece of equipment. Simply putting hyperlinks or data tables to represent the new controls is not acceptable.
 - viii. The contractor will provide all network wiring and will provide all graphics, front-end programming to map up the controls. The contractor will include all FX-80 additional licenses as necessary to accommodate the controls.
 - ix. Floorplan links and information: The main floor layout of each floor will indicate the room numbers and provide a hyperlink to the unit's respective equipment. The main 3-d floorplan will also display the following information for all DDC controlled equipment, on the main floor layout, to allow the user to get the main information for controlling the building without having to navigate to the individual equipment:
 - a. Space Temperature
 - b. Occupancy Status
 - c. Thermographic representation of deviation of space temperature of a space from its active setpoint. If 2°F colder than space temp, blue, if 2°F warmer, red, and gradual color change for the range in-between.
 - x. Override and offline Indication: All overridden points/setpoints will be displayed on the graphic in a purple color background, with white text. All points operating under

normal control logic will be in black backgrounds with white or yellow text. All points that are offline will be indicated in yellow background with black text.

- xi. Alarm Indication: Alarms shall be programmed to display on a customized graphical alarm screen indicating when any unit's supply fan command does not match the supply fan status. Low discharge temperature alarms shall also be indicated on the alarm screen if the discharge temperature of any unit drops below 45°F. An Alarm notification image will indicate on the home page and on every graphical page indicating an unacknowledged alarm condition. The flashing alarm notification will disappear once the user has acknowledged the alarm, but the alarm will remain in the alarm history database.
- xii. All DDC points indicated in the points list to be trended will be recorded at 1-hour intervals (or change of value).
 - a. If more than (1) FX-80 controller is required, the contractor, as part of this project, will furnish and install (1) PC Server Workstation's with Johnson N4 FX Server as follows:
 - i. A graphical annunciator will be provided on each of the graphical pages alerting the user of an alarm condition. The alert will subside once the alarm condition is acknowledged.

2. New Unit Ventilators

- a. The ATC Contractor shall provide, install, wire and program a Johnson Controls FX-PCG BACnet field controller for each new unit ventilator.
- b. The following additional control devices shall be provided, installed and wired to the PCG controller for each new unit ventilator: (1) TE-6314P-1 wall-mounted temperature sensor, (1) TE-6315P-1 discharge air sensor (8' averaging capillary), (1) current relay wired to monitor the unit ventilator supply fan, (1) fail-safe, normally closed outside air damper actuator, (1) fail-safe, normally open, modulating control valve.
- c. The unit ventilators will be provided with a factory-installed freeze-stat. This is to be left in place to shut the fan off when a freezing condition occurs. Whenever the fan is off, the outside air damper will be closed. As an added feature, the DDC controller will use the discharge air sensor to detect a potential freezing condition. The set point will be 5° higher than the set point of the factory freeze-stat. If such a condition occurs, an alarm will be displayed on the front-end PC and an email will be sent from the DDC front-end system to those recipients designated by the District. The alarm and email messages will indicate which unit vent caused the alarm and be stamped with the date and time that the alarm occurred. Whenever the unit vent fan is off, the outside air damper shall be fully closed.
- d. All setpoints will be adjustable from the BMS front-end.
- e. Occupied Mode: During the occupied period, the unit vent fan will run continuously. Once the fan has been proven running by a current relay wired as a binary input to the DDC controller, the outside air damper shall open to its minimum position (adjustable from the BMS front-end). The heating control valve will modulate to maintain the space heating setpoint. As the space temperature rises above the room set point, the heating command will be off, and the outside air damper will be modulated open beyond the minimum position. The discharge low limit program in the FX-PCG controller shall modulate the heating command and outside air damper in sequence, without overlap, to maintain a discharge air temperature of 60°F (adjustable from the BMS front-end).
- f. Fan Control: The Unit Ventilator will be provided with an ECM motor for the supply fan, with a factory ECM control board. The ATC contractor will interface with the factory ECM board to provide a 0-100% speed signal to the ECM board. The fan speed setting will be adjustable from the BMS front-end. The factory ECM board will be programmed by the UV manufacturer with minimum speed settings.
- g. Unoccupied Mode: During unoccupied periods the PCG controller will cycle unit ventilator's supply fan to maintain a lower, unoccupied space set point (adjustable). The heating valve

will be modulated to maintain the night heating setpoint. The outside air damper shall be fully closed during unoccupied mode.

- h. As an additional freeze protection safety, the PCG controller shall be programmed to shut off the unit vent's fan if the unit vent's discharge temperature drops below 38°F. The PCG shall automatically reset this freeze alarm and restart the fan once the discharge air temperature rises above 50°F and a minimum ten-minute time delay has elapsed.
- i. All outside air dampers shall fail in the closed position.
- j. For any units that have existing, or new auxiliary finned tube radiation as shown on the plans, a dedicated control signal from the DDC controller will cycle a new auxiliary radiation control valve (provided by the ATC Contractor) to maintain the space setpoint. A lower set point will be maintained during the unoccupied cycle.

3. New ERV Unit

- a. The unit shall be controlled by Johnson NS-BHB room mounted sensors to maintain occupied and unoccupied space temperature set points and relative humidity, at the locations as shown on the plans. The sensors will have no adjustment – all setpoint adjustments will be made at the DDC front-end.
- b. A Johnson TE-6315P-1 discharge air sensor (8' averaging capillary), TE6315P-1 mixed air temperature sensor and FX controller are to be installed for each unit. A Johnson Controls FX-PCA Advanced application controller shall be provided for control of the unit.
- c. The DDC front-end will index the unit between occupied and unoccupied cycles. Whenever the unit's supply fan is off, the outside air damper shall be fully closed. The ATC contractor will provide and install a freeze-stat, wired to shut of the supply and exhaust fan in all positions of the H-O-A switch. Manual reset of the freezestat is required. As an added feature, the DDC controller will use the discharge air sensor to detect a potential freezing condition. The set point will be 5° higher than the set point of the freeze-stat. If such a condition occurs, the outside air damper shall close, the fans will shut down, the heating valve shall open, and an alarm generated at the DDC front-end. Whenever the unit's supply fan is off, the outside air damper shall be fully closed.
- d. The units shall be tied into the building's FX DDC control system for occupied/unoccupied cycle operation. All setpoints will be adjustable from the FX front-end.
- e. The exhaust fan will run whenever the unit is in occupied mode and the supply fan is proven running. Status of the fans will be monitored at the BMS front-end.
- f. Optimal Start: An adaptive optimal start algorithm shall be used to enable the unit with the outside air damper closed and heating valve open to warm-up the space prior to occupancy time, necessary to achieve zone occupied temperature setpoints by the start of scheduled occupied period. The learning adaptive algorithm shall compare the zone temperature to its setpoint at beginning of scheduled occupied period and shall automatically adapt the heating response time for the next unoccupied period. The maximum warm-up start time will be adjustable at the DDC front-end. At no later than the scheduled occupancy time, the unit will transition to occupied mode sequence as indicated below, with the outside air damper modulating open to minimum position to provide minimum required volumetric flow of outside air (adjustable).
- g. Economizer Damper Control: During the occupied mode once the fan has been proven running, the economizer dampers will move to their minimum position. The economizer dampers will modulate to maintain the mixed air setpoint.
- h. Occupied Cycle: The supply fan shall run continuously. When the fan has been proven running, the economizer dampers will move to their minimum open position. Whenever the space temperature is below the occupied space set point, the heating valve will be fully open and the outside air damper will be at its minimum open position. The heating valve will modulate to maintain the discharge air temperature at the discharge heating setpoint.

The discharge air setpoint shall reset automatically between the discharge high limit of 100°F (adjustable) and low limit of 60°F (adjustable) reset based on deviation of the space temperature from the space heating setpoint. Upon a rise in space temperature above the space setpoint, the heating valve will be closed and the outside air damper shall modulate open beyond the minimum position. The discharge low limit program will maintain a minimum discharge temperature of 60° (adjustable) by closing the outdoor air damper and opening the heating valve, in sequence. When the space temperature exceeds the space setpoint, the dampers will modulate open beyond the minimum position.

- i. Occupied Cycle – Cooling Mode (Mechanical DX cooling): The FX front-end will determine the heating and cooling modes of the unit based on the outdoor air temperature/free cooling availability. If the space is on a call for cooling and there is no free cooling available and the supply fan is proven running, the outdoor air damper will move to its minimum position (adjustable from the front-end) and the controller will enable and modulate the DX cooling to maintain the space cooling set point.
 - j. Occupied Cycle – Dehumidification: When the fan is proven running and the space relative humidity is above the space humidity setpoint (adjustable, the DDC controller will enable and modulate the dehumidification and hot gas reheat to maintain the space humidity and temperature setpoint.
 - k. Heat Recovery Wheel: The heat recovery wheel will operate under factory installed safeties. Whenever the supply fan is proven running and the unit is in heating mode or DX cooling mode, the heat recovery wheel will be energized. When the unit is in free cooling mode, the heat recovery wheel will be off. Whenever the supply fan is off, the heat recovery wheel will be off. The status of the heat recovery wheel will be monitored at the DDC front-end.
 - l. During the unoccupied cycle the unit's supply fan shall be cycled to maintain space setback temperature set point. The heating valve will be modulated to maintain the night heating setpoint. The outside air dampers shall be closed.
 - m. All outside air dampers shall fail in the closed position.
 - n. All valves shall fail in the open position.
4. **New Relief Hoods / motorized dampers:**
- a. As shown on the plans, relief dampers/hoods shall have motor operated dampers that shall parallel the position of the outside air damper of the associated UV/CUH.
 - b. For fresh air motorized dampers that are serving more than one equipment, the motorized damper will open when any of the equipment served is in day mode and the fan status proven running.
5. **Dynamic Color Graphics Requirements**
- a. The color graphics that the user will see to operate the system shall be resident in the FX web-based front-end. The main graphic shall be a three-dimensional floor plan of the building with links to each room and its HVAC system. The display will provide links to all DDC equipment in the building. Links to data trends and schedules shall be located on each system's graphic screen.
 - b. Existing graphics will be modified and updated to provide a single floorplan for each floor of the respective building showing all new and existing equipment on the same floorplan.
 - c. The minimum point information that is to be mapped to the front-end panel and shown in the color graphic screens is as follows:

Unit Ventilators				
Description	Point	History	Alarm	Totalize
Damper Command	AO	X		
Discharge Air Temperature	AI	X	X	
Discharge Low Limit Set Point	AV	X		

Heating Valve Command	AO	X		
Minimum Outdoor Air Damper Position (adjustable)	AV	X		
Occupied Command	BV			
Occupied Space Temp Set Point	AV	X		
Occupied Status	BV	X		
Outside Air Temperature	AI	X		
Space Temperature	AI	X	X	
Status of DDC controller	BV		X	
Supply Fan Command	BO	X	X	
Supply Fan Speed	AO	X	X	
Supply Fan Status	BI	X	X	X
Unoccupied Space Set Point	AV	X		
Status of DDC controller	BV		X	

Auditorium Rooftop Units (ERV, Dehumidification)				
Description	Point	History	Alarm	Totalize
Discharge Air Temperature	AI	X	X	
Mixed Air Temperature	AI	X	X	
Space Temperature	AI	X	X	
Space Relative Humidity	AI	X	X	
Outside Air Temperature	AV	X		
Unoccupied Space Temperature Set Point	AV	X		
Occupied Space Temperature Set Point	AV	X		
Occupied Space Relative Humidity Set Point	AV	X		
Active Temperature Setpoint	AV	X		
Active Relative Humidity Setpoint	AV	X		
Mixed Air Low Limit Set Point	AV	X		
Discharge Air Low Limit Set Point	AV	X		
Heating Valve	AO	X		
Cooling Enable	BO	X		
Cooling Demand	AO	X		
Outside Air Damper Command	AO	X		
Exhaust Air Damper Command	AO	X		
Return Air Damper Command	AO	X		
Dehumidification/Hot Gas Reheat Command	AO	X		
Heat Recovery Wheel Status	BI	X	X	X
Heat Recovery Wheel Command	BO	X	X	
Supply Fan Status	BI	X	X	X
Supply Fan Command	BO	X	X	
Exhaust Fan Status	BI	X	X	X
Exhaust Fan Command	BO	X	X	
Occupied Command	BV			
Occupied Status	BV	X		
Status of DDC controller	BV		X	

Section 3 – Historical Data Trending Requirements

All points indicated will be trended in the DDC front-end to record historical data for a period of 7 days, trended once per hour. The District intends to track these data for improving efficiency and occupancy conditions.

Section 4 – Hardware requirements:

A. General Description:

1. The Building Automation System (BAS) shall use an open architecture and where applicable support a multi-vendor environment. To accomplish this effectively, the BAS shall not be limited to a single open communication protocol standard, but to also integrate third-party devices and applications via additional protocol and through the latest software standards. The system configuration shall be available for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.
2. The Building Automation System shall consist of the following:
 - a. DDC Controllers (HVAC, etc.)
 - b. Input, Output Modules
 - c. Local Display Devices
 - d. Portable Operator's Terminals – Portable PC's
 - e. Distributed User Interfaces
 - f. Network processing, data storage and communications equipment
 - g. Other components required for a complete and working BAS
3. The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.
4. The system architectural design shall eliminate dependence upon any single device for alarm generation and control execution. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.
5. Acceptable Systems
 - Facility Explorer by Johnson Controls
 - Others per addendum

B. BAS Architecture – Automation Network

1. The automation network shall be configured as a Client/Server network with a web server operating on the Client's LAN/WAN. The web browser interface is extended over the LAN/WAN. Monitoring and control of the BAS is available using the web browser interface.
2. The automation network shall include the option of a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.
3. The BAS shall network multiple user interface clients, system controllers and systems supervisors as required for systems operation.
4. The automation network option shall be capable of operating at a communication speed of 100 Mbps.
5. The automation network option will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

C. BAS Architecture – Control Network

1. Network Automation Controllers, LP-FX80, (NAC) shall provide management over the control network(s) and shall support the following communications protocols:
 - BACnet® Standard (ANSI/ASHRAE Standard 135-) MS/TP master.
 - LONWORKS® enabled devices using the free topology transceiver (FTT-1x).
 - Johnson Controls® N2 Open.
 - Modbus RTU and Modbus TCP.

2. The NAC shall be BTL (BACnet Testing Laboratories) listed as B-BC (BACnet Building Controller) and support the following data link options:
 - BACnet Internet Protocol (IP) (Annex J).
 - BACnet IP (Annex J) Foreign.
 - ISO 8802-3, Ethernet (Clause 7).
3. Control networks shall provide either "Peer-to-Peer," Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.
4. Digital Controllers shall reside on the control network.
5. A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided for each controller device (master or slave) that will communicate on the BACnet MS/TP Bus.
6. The PICS shall be submitted 10 days prior to bidding.

D. User Interface – Browser Based Interface

1. The system shall be capable of supporting an unlimited number of clients using standard Web browser such as Internet Explorer™ or Mozilla Firefox™. Systems requiring additional software (to enable a standard Web browser) to be resident on the client machine, or manufacture-specific browsers shall not be acceptable.
2. The Web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the Building Automation System (BAS), shall not be acceptable.
3. The Web browser client shall support at a minimum, the following functions:
 - a. User log-on identification and password shall be required. If an unauthorized user attempts access, notice of access failure shall be displayed. Security using authentication and encryption techniques to prevent unauthorized access shall be implemented.
 - b. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.
 - c. Storage of the graphical screens shall be in the Network Automation Controller (NAC) or the server, without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
 - d. Real-time values displayed on a Web page shall update automatically without requiring a manual "refresh" of the Web page.
 - e. Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:
 - f. Modify common application objects, such as schedules and setpoints in a graphical manner.
 - g. Commands binary objects to start and stop.
 - h. View logs and charts.
 - i. View alarms.
4. Graphic screens on the Web Browser client shall support hypertext links to other locations on the Internet or on Intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

E. User Interface – Alarms

1. Alarm feature shall allow user configuration of criteria to create, route, and manage alarms and events. It shall be possible for specific alarms from specific points to be routed to specific alarm recipients. The alarm management portion of the user interface shall, at the minimum, provide the following functions:
 - a. Allow configuration to generate alarms on any numeric, binary, or data point in the system.
 - b. Generate alarm records that contain a minimum of a timestamp, original state, acknowledged state, alarm class and priority.
 - c. Allow the establishment of alarm classes that provide the routing of alarms with similar characteristics to common recipients.
 - d. Allow a user, with the appropriate security level, to manage alarms - including sorting, acknowledging, and tagging alarms.

F. User Interface – Reports and Summaries

1. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:
 - a. All points in the BAS
 - b. All points in each BAS application
 - c. All points in a specific controller
 - d. All points in a user-defined group of points
 - e. All points currently in alarm
 - f. All BAS schedules
 - g. All user defined and adjustable variables, schedules, interlocks and the like
2. Reports shall be exportable to .pdf, .txt, or .csv formats.
3. The system shall allow for the creation of custom reports and queries.

G. User Interface – Schedules

1. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:
 - a. Regular schedules
 - b. Repeating schedules
 - c. Exception Schedules
2. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.
3. It shall be possible to define one or more exception schedules for each schedule including references to calendars.
4. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days. Holidays and special days shall be user-selected with the pointing device or keyboard.

H. User Interface - Passwords

1. Multiple-level password access protection shall be provided to allow the system manager to assign user interface control, display, and database manipulation capabilities deemed appropriate for each user based on an assigned password.
2. Each user shall have the following: a username, a password, and access levels.
3. The system shall provide the capability to require a password of minimum length and require a combination of characters and numerical or special characters.
4. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.
5. The system shall provide unlimited flexibility with access rights. A minimum of four levels of access shall be provided along with the ability to customize the system to provide additional levels.
6. A minimum of 100 unique passwords shall be supported.
7. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.
8. The system shall automatically generate a report of log-on/log-off and system activity for each user.
9. All log data shall be available in .pdf, .txt, and .csv formats.

I. User Interface – Dynamic Color Graphics

1. The graphics application program shall be supplied as an integral part of the User Interface.
2. The graphics applications shall include a create/edit function and a runtime function. The system architecture shall support an unlimited number of graphics documents (graphic definition files) to be generated and executed.
3. The graphics shall be able to display real-time data that is acquired, derived, or entered.
4. Graphics runtime functions –Each graphic application shall be capable of the following functions:
5. All graphics shall be fully scalable
6. The graphics shall support a maintained aspect ratio.
7. Multiple fonts shall be supported.
8. Unique background shall be assignable on a per graphic basis.

9. Operation from graphics – It shall be possible to change values (setpoints) and states in systems controlled equipment within the Web browser interface.
10. Graphic editing tool – A graphic editing tool shall be provided that allows for the creation and editing of graphic files. The graphic editor shall be capable of performing/defining all runtime binding.

J. Historical Data Collection

1. All numeric, binary or data points in the system database shall allow their values to be logged over time (trend log). Each historical record shall include the point's name, a time stamp including time zone, and the point's value.
2. The configuration of the historical data collection shall allow for recording data based on change of value or on a user-defined time interval.
3. The configuration of the historical data collection shall allow for the collection process to stop or rollover when capacity has been reached.
4. A historical data viewing utility shall be provided with access to all history records. This utility shall allow historical data to be viewed in a table or chart format.
5. The history data table view shall allow the user to hide/show columns and to filter data based on time and date. The history data table shall allow exporting to .txt, .csv, or .pdf file formats.
6. The historical data chart view shall allow different point histories to be displayed simultaneously, and also provide panning and zooming capabilities.

K. Audit Log

1. For each log entry, provide the following data:
 - a. Time and date
 - b. User ID
 - c. Change or activity: i.e., Change setpoint, add or delete objects, commands, etc.

L. Network Automation Controller (NAC) – LP-FX80

The NAC must provide the following hardware features as a minimum:

1. Memory
 - a. RAM Memory: 1GB DDR3 SD RAM
 - b. Flash Memory: 4GB flash total storage, 2 GB user storage
 - c. Expandable communications ports including LON, RS485, Modem, Wireless Terminal Equipment Control
 - d. All required protocol drivers as required by the sequence of operation.
2. Communications
 - a. Two 10/100 Mb Ethernet Port – RJ-45 connections
 - b. Two RS-485 ports
 - c. Expandable communications ports including LON, RS485, Modem, Wireless Terminal Equipment Control
 - d. All required protocol drivers as required by the sequence of operation.
3. Battery Backup
 - a. Battery backup provided for all on board functions including I/O
 - b. Battery is monitored and trickle charged
 - c. Battery maintains processor operation through power failures for a pre-determined interval, and then writes all data to flash memory, shuts the processor down, and maintains the clock for three months.
4. Environment
 - a. Must be capable of operation over a temperature range of -4°F to 140°F).
 - b. Must be capable of withstanding storage temperatures of between -40°F to 185°F).
 - c. Must be capable of operation over a humidity range of 5% to 95% RH, non-condensing
5. The Network Automation Controller (NAC) shall be a fully user-programmable device capable of providing all the capability described above.
6. Automation network – The Network Automation Controller (NAC) shall reside on the automation network. Each NAC shall support one or more sub-networks of controllers.

7. The Network Automation Controller shall have the capability to communicate directly with Modbus without the use of an additional gateway.
8. The Network Automation Controller shall have the capability to provide secure communications via SSL (Secure Socket Layer).
9. User Interface – Each Network Automation Controller (NAC) shall have the ability to deliver a web based user interface as previously described. All computers connected physically or virtually to the automation network shall have access to the web based UI.
10. Power Failure – In the event of the loss of normal power, The Network Automation Controller (NAC) shall continue to operate for a defined period after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software. Flash memory shall be incorporated for all critical controller configuration data.
11. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions.
12. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.
13. Certification – All controllers shall be listed by Underwriters Laboratories (UL).

M. Input Device Characteristics

- a. General Requirements: Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.
- b. Temperature Sensors: Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations. The temperature sensor shall be of the resistance type and shall be either two-wire 1000-ohm nickel RTD, or two-wire 1000-ohm platinum RTD.
- c. Room Temperature Sensors: Room sensors shall be constructed for either surface or wall box mounting.
- d. Thermo wells: When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure. Thermo wells and sensors shall be mounted in a threaded or ½-inch NPT saddle and allow easy access to the sensor for repair or replacement. Thermo wells shall be constructed of 316 stainless steel.
- e. Outside Air Sensors: Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.
- f. Control Relays: Control pilot relays shall be of a modular plug-in design with retaining springs or clips. Mounting bases shall be snap-mount. DPDT, 3PDT, or 4PDT relays shall be provided as appropriate for application. Contacts shall be rated for 10 amps at 120 VAC. Relays shall have an integral indicator light and check button. Acceptable manufacturers: Idec, Functional Devices
- g. Electronic/Pneumatic Transducers: Electronic to Pneumatic transducers shall provide: Output: 3-15 psig,
- h. Input: 4-20 mA or 0-10 VDC, manual output adjustment, pressure gauge external replaceable supply air filter. Acceptable manufacturers: Johnson Controls, Mamac

N. APPLICATION SPECIFIC CONTROLLERS

1. **General Purpose Programmable Controllers (PCG)**
 - a) The General Purpose Programmable Controller (PCG) shall be a fully user-programmable, digital controller that communicates via BACnet MS/TP protocol.
 - b) The PCG shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.
 - c) A BACnet Protocol Implementation Conformance Statement shall be provided for the PCG.
 - d) The Conformance Statement shall be submitted 10 days prior to bidding.
 - e) The PCG shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.

- f) The PCG shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable
- g) The PCG shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
- h) The PCG shall include a removable base to allow pre-wiring without the controller.
- i) The PCG shall include troubleshooting LED indicators to identify the following conditions:
 - i. Power On
 - ii. Power Off
 - iii. Download or Startup in progress, not ready for normal operation
 - iv. No Faults
 - v. Device Fault
 - vi. Field Controller Bus - Normal Data Transmission
 - vii. Field Controller Bus - No Data Transmission
 - viii. Field Controller Bus - No Communication
 - ix. Sensor-Actuator Bus - Normal Data Transmission
 - x. Sensor-Actuator Bus - No Data Transmission
 - xi. Sensor-Actuator Bus - No Communication
- j) The PCG shall accommodate the direct wiring of analog and binary I/O field points.
- k) The PCG shall support the following types of inputs and outputs:
- l) Universal Inputs - shall be configured to monitor any of the following:
 - i. Analog Input, Voltage Mode
 - ii. Analog Input, Current Mode
 - iii. Analog Input, Resistive Mode
 - iv. Binary Input, Dry Contact Maintained Mode
- m) Binary Inputs - shall be configured to monitor either of the following:
 - i. Dry Contact Maintained Mode
 - ii. Pulse Counter Mode
- n) Analog Outputs - shall be configured to output either of the following
 - i. Analog Output, Voltage Mode
- o) Analog Output, current Mode
- p) Binary Outputs - shall output the following:
 - i. 24 VAC Triac
- q) Configurable Outputs - shall be capable of the following:
 - i. Analog Output, Voltage Mode
 - ii. Binary Output Mode
- r) The PCG shall have the ability to reside on a Field Controller Bus (FC Bus).
 - i. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
 - ii. The FC Bus shall support communications between the PCGs and the Supervisory Controller.
 - iii. The FC Bus shall also support Expansion I/O (PCX) communications with the PCG and with the Supervisory Controller.
- s) The FC Bus shall operate at a maximum distance of 15,000 Ft. between the PCG and the furthest connected device.
- t) The PCG shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus).
 - a) The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard Protocol SSPC-135, Clause 9.
 - b) The SA Bus shall support up to 10 devices per trunk.
 - c) The SA Bus shall operate at a maximum distance of 1,200 Ft. between the PCG and the furthest connected device.
- u) The PCG shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the FC Bus or the SA Bus.
- 2. The PCG shall support, but not be limited to, the following:
 - a) Chilled water/central plant automation applications including but not limited to:
 - i) the selection and sequencing of up to 8 chillers of different sizes
 - ii) the selection and sequencing of up to 8 (each) primary and secondary chilled water pumps of varying pump capacities
 - iii) the selection and sequencing of up to 8 condenser water pumps

- iv) the selection and sequencing of cooling towers and bypass valve, including single speed, multi-speed, and Vernier control
 - v) a proven and documented central cooling plant optimization program that incorporates custom equipment efficiency profiles, without rewriting software code, to meet the building load using the least amount of energy as calculated
 - vi) the use of advanced control algorithms that apply equipment specific parameters, including operational limits and efficiency profiles, to determine equipment, start and runtime preferences
 - vii) the identification of the most efficient equipment combination and automatic control of state and speed of all necessary equipment to balance runtime, optimize timing and sequencing and ensure the efficiency and stability of the central cooling plant
 - viii) the control definition for the chiller plant in a single FX-PCG, as supported by available memory and point Input/Output (I/O), or capable of being split across multiple FX-PCGs
 - a) Heating central plant applications
 - b) Built-up air handling units for special applications
1. Terminal and packaged units
 2. Special programs as required for systems control

2. Programmable Controller Expansion I/O Modules (PCX)

- a) The Programmable Controller Expansion I/O Module (PCX) provides additional inputs and outputs for use in the PCG.
 - b) The PCX shall communicate with the PCG over the FC Bus or the SA Bus.
 - c) The PCX shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.
 - d) A BACnet Protocol Implementation Conformance Statement shall be provided for the PCG.
 - e) The Conformance Statement shall be submitted 10 days prior to bidding.
 - f) The PCX shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
 - g) The PCX shall have a minimum of 4 points to a maximum of 17 points.
 - h) The PCX shall support the following types of inputs and outputs:
 - i. Universal Inputs - shall be configured to monitor any of the following:
 - (i) Analog Input, Voltage Mode
 - (ii) Analog Input, Current Mode
 - ii. Analog Input, Resistive Mode
 - iii. Binary Input, Dry Contact Maintained Mode
 - iv. Binary Inputs - shall be configured to monitor either of the following:
 - (i) Dry Contact Maintained Mode
 - (ii) Pulse Counter Mode
 - v. Analog Outputs - shall be configured to output either of the following
 - (i) Analog Output, Voltage Mode
 - (ii) Analog Output, current Mode
 - vi. Binary Outputs - shall output the following:
 - (i) 24 VAC Triac
 - vii. Configurable Outputs - shall be capable of the following:
 - (i) Analog Output, Voltage Mode
 - (ii) Binary Output Mode
3. The PCX shall include troubleshooting LED indicators to identify the following conditions:
 - (i) Power On
 - (ii) Power Off
 - (iii) Download or Startup in progress, not ready for normal operation
 - (iv) No Faults
 - (v) Device Fault
 - (vi) Normal Data Transmission
 - (vii) No Data Transmission
 - (viii) No Communication

(END OF SECTION)

(END OF SECTION)

Automatic Temperature Control Systems

Section 1 - General Requirements.

A. GENERAL

1. Furnish and install all temperature controls including all devices and accessories required for the installation of a complete Johnson web-based Facility Explorer energy management and control system.
2. All new controls shall be of the DDC type unless specified otherwise. All DDC controls shall be manufactured by Johnson Controls. The design make for the web-based front-end controller is Johnson Controls Facility Explorer LP-FX80; all local DDC controllers is Johnson Controls Facility Explorer PCG/PCA. All new controls shall be networked to this new FX80 controller. The contractor will include all additional licenses as necessary to accommodate the new controls.
3. The contractor shall be authorized by the system manufacturer and shall submit training certificates and current proof that the contractor is a *Johnson Controls Authorized Building Controls Specialist (ABCS)*.
4. Under no circumstances, will the Owner accept bids for DDC systems that are proprietary in nature. If the bidding contractor is including a DDC system other than Johnson FX-80, it must meet all the requirements of this specification and the contractor must list the DDC system in a substitutions list and include the following information with his bid:
 - a. The DDC system they are proposing.
 - b. A list of at least two additional sources for the installation, service and purchase of repair parts within a 50-mile radius of the School District. These sources must be completely independent from the bidding contractor. The intent is to assure the District that they are not entering into a proprietary arrangement.
 - c. Written assurance that the proposed substitute DDC system meets all the requirements of this specification.
5. Control systems shall be complete in all respects, including all labor, materials, equipment and service necessary. The controls shall be of the DDC type unless otherwise specified.
6. Systems shall include, but not be limited to, all application specific controllers, transducers, transformers, cabinets, valves and operators, dampers and operators, relays, sensors, switches and terminals.
7. Systems shall be installed by competent mechanics regularly employed by a company whose primary business is the installation of automatic temperature control systems. The company must employ at least two control specialists who have successfully completed at least one Johnson factory-authorized 5-day training program on the controls specified for this project. The contractor will be required to submit proof of such training in the form of a Johnson Controls Institute Certificate.
8. Installation shall include all control components, installation of all control wiring and pneumatic tubing. All wiring required for interlocking and interfacing controls with the equipment to be controlled, whether low voltage or line voltage; calibration and adjustment of all controls, dampers, linkages, etc is part of this contract.
9. All control wiring concealed in walls or run in open areas of machine rooms shall be in conduit. In other locations, plenum rated cable shall be used.
10. The ATC Contractor shall provide PDF submittal books showing how he proposes to complete the work specified herein. In this book, the ATC Contractor shall submit description of operation and schematic drawings, produced in AutoCAD, showing the wiring and pneumatic tubing of the entire control system to the District for review before starting any work. Bulletins describing each item of control equipment or component shall be included.

11. Upon completion of his work, the ATC Contractor shall provide PDF Operation & Maintenance Manuals showing exactly how each component of the system was installed, specifically noting any changes from the submittal book, and who authorized the change. Schematic drawings, sequences of operation and technical literature must be provided for all components of the system.
12. All automatic temperature control work completed under this Contract shall be covered under a one (1) year warranty and service contract effective on date of acceptance. Scheduled maintenance service shall be provided to attend to the normal maintenance required for proper system operation in the building.
13. It is the Contractor's responsibility to inspect the buildings, their existing systems and the project drawings to verify exact quantities of devices and controls required for the systems specified. No allowance will be made if the Contractor fails to make such an examination.
14. Provide nameplates on all devices, whether or not mounted on the face of the central and local control panels. In occupied areas, nameplates shall be concealed beneath covers of room type instruments, to describe functions.
15. All control panels shall include wire markers for each wire, with an identifying wiring diagram.
16. The Control Contractor shall provide a minimum of two (2) three-hour training classes on the system operation and maintenance. This is to include both classroom and on-site training to ensure that the District's custodial and maintenance personnel have adequate knowledge of the control system's features as well as operation and maintenance requirements. The Contractor will provide printed documentation to all persons attending the training sessions.

B. THERMOSTATS/TEMPERATURE SENSORS

1. Thermostat or sensor locations not shown on the drawings shall be subject to approval of the Architect. All thermostats or sensors sensing temperature within ductwork or at coils are to be provided with elements of sufficient length to measure average temperature across the duct cross section or coil face. DDC space sensors shall have no local setpoint adjustment or override capability. It is the intent to make all adjustments from the front-end.

C. VALVES

1. All automatic control valves shall be fully proportioning unless otherwise specified, quiet in operation, and shall be arranged to fail-safe in either a normally open or normally closed position in the event of power failure. The open or closed position shall be as specified or as required to suit job conditions. Valves shall be capable of operating at varying rates of speed to correspond to the exact dictates of the controller and variable load requirements. Provisions shall be made for valves operating in sequence with other valves or damper operators to have adjustable operating ranges and starting points to provide flexibility of adjustment, sequencing and throttling range.
2. Valves shall be sized by the Contractor and guaranteed to meet the heating or cooling requirements as specified, and as indicated on the drawings. Unless otherwise specified, control valves shall have 125 psig cast iron bodies with flanged connections on valves 2 1/2" or larger. Unless otherwise specified, valve bodies shall have the same pressure characteristics as the piping in which they are installed.
3. No single valve, except zone valves, shall be larger than 2" in size. Where the capacity of equipment to be controlled requires a valve larger than 2", two (2) valves shall be installed in parallel with the smaller valve sized for a maximum of 1/3 of the total capacity.
4. Actuators shall be electronic. They shall be mechanically fail-safe. **Capacitor-based fail-safe actuators are not acceptable.**

D. AUTOMATIC DAMPERS

1. Automatic dampers shall be supplied and sized by the Contractor to properly control the flow of air using methods similar to control valve sizing. The Sheet Metal Subcontractor shall provide required safing to fit the damper into the duct work. The dampers shall be constructed with galvanized blades and frames. Blades shall not exceed 6" in width and shall be provided with special replaceable rubber seals on the blade edges and sides. Blades shall be formed from two spot-welded sheets

for extra strength. Frames shall be channel shaped for strength, and to enclose linkage thus keeping linkage out of air stream.

2. The entire construction shall be such that leakage does not exceed 10 cfm per square foot with 2" of static pressure across the damper.
3. Dampers shall have opposed, or parallel blades as required by the application. The proper linkage shall be furnished to provide equal percentage or linear characteristics as required by the application.

E. CONTROL PANELS

1. All control panels for this project will meet the following requirements **as a minimum**:
 - i. The control panel shall be a fully enclosed cabinet, of baked enamel, steel or aluminum material construction and shall meet the requirements of NEMA 1 enclosures.
 - ii. The panel will have a hinged door with a locking latch.
 - iii. Each component on the front panel shall have an appropriate engraved nameplate fabricated from .062" or .125" thick phenolic material, with engraved permanent lettering. **Stick-on labels are not acceptable.**

F. DDC SYSTEM WIRING

1. All conduit, wiring, accessories and wiring connections required for the installation of the Building Automation System, as herein specified, shall be provided by this Contractor unless specifically shown on the Electrical Drawings under Division 16 Electrical. The contractor shall provide, install and wire all repeaters, terminators as recommended by the BMS manufacturer.
2. All wiring shall comply with the requirements of applicable portions of Division 16 and all local and national electric codes, unless specified otherwise in this section.
3. All control wiring materials and installation methods shall comply with DDC system manufacturer's recommendations.
4. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of this Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by this Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.

G. QUALITY ASSURANCE

1. The District must have assurance that the Contractor has full-time employees that are certified in the specified product line and has the resources within the Contractor's company to meet the requirements of this project.
 - a. As part of the BMS/controls submittal documentation, the Contractor is to supply the name and experience/qualifications of at least full-time six employees the Contractor currently employs. These technicians should have at least five years' experience with the specified product line and in the automatic temperature control field. Employees of sub-contractors, suppliers or distributors are not eligible.
 - b. The contractor will also submit copies of factory-sponsored training certificates of at least three employees certifying they have completed the manufacturer approved certification course on the specified Johnson Controls product line.
2. The Contractor shall be authorized by the system manufacturer and shall submit training certificates and current proof that the contractor is a Johnson *Authorized Building Control Specialist* (ABCS). If the bidding contractor *is not a Johnson Controls ABCS Contractor, the bidding contractor shall*:
 - a. *Provide a letter from the BMS manufacturer stating that the BMS manufacturer is fully supporting the proposed Contractor and their technical capability for the duration of the project and the warranty period, and that the BMS manufacturer is undertaking liability in the event the contractor is unable to complete the project as specified.*
3. The Contractor shall be an independent contractor whose primary business is the engineering, programming, installation/wiring and service of total integrated building management systems.

4. The Contractor shall have a fully staffed facility within a 50-mile radius of the project site supplying complete support and maintenance services available 24 hours-a-day, 7-days-a-week basis.

Section 2 – Sequences of Operation.

1. Front-end

- a. Furnish and install all temperature controls including all devices and accessories required for the installation of a complete Johnson web-based energy management and control system.
 - i. A new Johnson Facility Explorer N4 based FX-80 web-based front-end controller will be installed to provide supervisory control of all new and existing DDC equipment in the building.
 - ii. ***The front-end database will be developed with HTML5, based on Tridium N4 platform, and is not to include any client-side java components. The front-end interface must run as a complete system without the need and use of java on the browser computers used by the Maintenance Personnel. Use of systems that rely on Java are not acceptable.***
 - iii. The new N4 FX-80 controller(s) will be licensed and provided with sufficient capacity to accommodate all equipment, sequences of operation and points lists provided, as well as an additional 20% spare point capacity.
 - iv. The ATC contractor will include providing the front-end controller(s) with a minimum 24-month period of software maintenance, to commence from the date of official BMS training to the Maintenance Personnel.
 - v. This contractor will furnish and install as many FX-80 controllers as required to accommodate all new equipment and maintain 20% spare capacity for future expansion. If the FX-80 controller cannot accommodate the new controls while still maintaining this expansion capability, additional FX-80 controllers and dedicated FX-Server with Server PC shall be provided at no additional cost to the owner. ***The contractor will be required to demonstrate this front-end capacity during training and in the O&M documentation.***
 - vi. The Contractor will provide schedules for all equipment, zoned by different areas of the building as designated by the Owner. Providing a separate dedicated schedule for each piece of equipment is not acceptable unless specifically directed by the Owner.
 - vii. This contractor will provide a graphical floor plan of the entire building, with links to all DDC controlled equipment. Upon completion of this project, all DDC controlled equipment will be one seamless DDC front-end with graphical interface for each piece of equipment. Simply putting hyperlinks or data tables to represent the new controls is not acceptable.
 - viii. The contractor will provide all network wiring and will provide all graphics, front-end programming to map up the controls. The contractor will include all FX-80 additional licenses as necessary to accommodate the controls.
 - ix. Floorplan links and information: The main floor layout of each floor will indicate the room numbers and provide a hyperlink to the unit's respective equipment. The main 3-d floorplan will also display the following information for all DDC controlled equipment, on the main floor layout, to allow the user to get the main information for controlling the building without having to navigate to the individual equipment:
 - a. Space Temperature
 - b. Occupancy Status
 - c. Thermographic representation of deviation of space temperature of a space from its active setpoint. If 2°F colder than space temp, blue, if 2°F warmer, red, and gradual color change for the range in-between.
 - x. Override and offline Indication: All overridden points/setpoints will be displayed on the graphic in a purple color background, with white text. All points operating under

normal control logic will be in black backgrounds with white or yellow text. All points that are offline will be indicated in yellow background with black text.

- xi. Alarm Indication: Alarms shall be programmed to display on a customized graphical alarm screen indicating when any unit's supply fan command does not match the supply fan status. Low discharge temperature alarms shall also be indicated on the alarm screen if the discharge temperature of any unit drops below 45°F. An Alarm notification image will indicate on the home page and on every graphical page indicating an unacknowledged alarm condition. The flashing alarm notification will disappear once the user has acknowledged the alarm, but the alarm will remain in the alarm history database.
- xii. All DDC points indicated in the points list to be trended will be recorded at 1-hour intervals (or change of value).
 - a. If more than (1) FX-80 controller is required, the contractor, as part of this project, will furnish and install (1) PC Server Workstation's with Johnson N4 FX Server as follows:
 - i. A graphical annunciator will be provided on each of the graphical pages alerting the user of an alarm condition. The alert will subside once the alarm condition is acknowledged.

2. New Unit Ventilators

- a. The ATC Contractor shall provide, install, wire and program a Johnson Controls FX-PCG BACnet field controller for each new unit ventilator.
- b. The following additional control devices shall be provided, installed and wired to the PCG controller for each new unit ventilator: (1) TE-6314P-1 wall-mounted temperature sensor, (1) TE-6315P-1 discharge air sensor (8' averaging capillary), (1) current relay wired to monitor the unit ventilator supply fan, (1) fail-safe, normally closed outside air damper actuator, (1) fail-safe, normally open, modulating control valve.
- c. The unit ventilators will be provided with a factory-installed freeze-stat. This is to be left in place to shut the fan off when a freezing condition occurs. Whenever the fan is off, the outside air damper will be closed. As an added feature, the DDC controller will use the discharge air sensor to detect a potential freezing condition. The set point will be 5° higher than the set point of the factory freeze-stat. If such a condition occurs, an alarm will be displayed on the front-end PC and an email will be sent from the DDC front-end system to those recipients designated by the District. The alarm and email messages will indicate which unit vent caused the alarm and be stamped with the date and time that the alarm occurred. Whenever the unit vent fan is off, the outside air damper shall be fully closed.
- d. All setpoints will be adjustable from the BMS front-end.
- e. Occupied Mode: During the occupied period, the unit vent fan will run continuously. Once the fan has been proven running by a current relay wired as a binary input to the DDC controller, the outside air damper shall open to its minimum position (adjustable from the BMS front-end). The heating control valve will modulate to maintain the space heating setpoint. As the space temperature rises above the room set point, the heating command will be off, and the outside air damper will be modulated open beyond the minimum position. The discharge low limit program in the FX-PCG controller shall modulate the heating command and outside air damper in sequence, without overlap, to maintain a discharge air temperature of 60°F (adjustable from the BMS front-end).
- f. Fan Control: The Unit Ventilator will be provided with an ECM motor for the supply fan, with a factory ECM control board. The ATC contractor will interface with the factory ECM board to provide a 0-100% speed signal to the ECM board. The fan speed setting will be adjustable from the BMS front-end. The factory ECM board will be programmed by the UV manufacturer with minimum speed settings.
- g. Unoccupied Mode: During unoccupied periods the PCG controller will cycle unit ventilator's supply fan to maintain a lower, unoccupied space set point (adjustable). The heating valve

will be modulated to maintain the night heating setpoint. The outside air damper shall be fully closed during unoccupied mode.

- h. As an additional freeze protection safety, the PCG controller shall be programmed to shut off the unit vent's fan if the unit vent's discharge temperature drops below 38°F. The PCG shall automatically reset this freeze alarm and restart the fan once the discharge air temperature rises above 50°F and a minimum ten-minute time delay has elapsed.
- i. All outside air dampers shall fail in the closed position.
- j. For any units that have existing, or new auxiliary finned tube radiation as shown on the plans, a dedicated control signal from the DDC controller will cycle a new auxiliary radiation control valve (provided by the ATC Contractor) to maintain the space setpoint. A lower set point will be maintained during the unoccupied cycle.

3. New Hot Water Pump P-5:

- a. The ATC contractor will fabricate, furnish, and install a new Johnson PCG control panel to provide the sequences below:
 - i. The ATC contractor will furnish and install a new TE-6313P-1 outdoor air temperature sensor located on a north-facing wall. The sensor will be hard-wired directly to the Pump Control Panel without relying on any intermediate controllers or front-end for data-sharing.
 - ii. Whenever the zone served by the pump is in the occupied mode, the pump will run continuously whenever the outside air temperature is below 60°F (adjustable).
 - iii. During the unoccupied cycle, the pump will be off unless the outside air temperature falls below 40°F (adjustable) or if the equipment in the zone is calling for heat at its night set back temperature.
 - iv. Whenever the outside air temperature is above 60°(adjustable), the pump will be off.
 - v. If a pump is commanded on and flow is not sensed within 30-seconds, an alarm will be generated at the front-end. A red alarm LED will also light on the face of the panel to indicate the pump alarm condition. The alarm condition will be reset by means of a reset switch on the face of the BMS panel.
 - vi. The ATC contractor will furnish and install new current switches for the pump. Pump status will be monitored at the BMS front-end. Pump failure and Pump-in-Hand notifications will be annunciated at the BMS front-end.
 - vii. The ATC contractor will include fail-safe relay wiring and logic in the pump control panel to ensure that if the PCG controller is unresponsive/locked up (no heartbeat) for 15 minutes, the pump relay will go to fail-safe mode and the pump will be indexed to run.

4. New Cabinet Heaters with outside air:

- a. A Johnson TE-6315P-1 discharge air sensor (8' averaging capillary), TE6314P-1 space temperature sensor and FX-PCG controller are to be installed for each unit.
- b. ***All units with outside air must be provided with a modulating globe-type heating valve and with discharge air low limit control as specified below. 2-position or floating valve control is not acceptable. Ball valves are not acceptable. This valve is to be provided by the controls contractor, installed by the Mechanical Contractor.***
- c. The units will be provided with a factory installed freeze-stat. This is to be left in place to shut the fan off when a freezing condition occurs. Whenever the fan is off, the outside air damper will be closed. As an added feature, the DDC controller will use the discharge air sensor to detect a potential freezing condition. The set point will be 5° higher than the set point of the factory freeze-stat. If such a condition occurs, the outside air damper will close, the heating valve will open, and an alarm will be displayed on the front-end and an email will be sent from the DDC front-end system to those recipients designated by the District. The alarm and email

messages will indicate which unit caused the alarm and be stamped with the date and time that the alarm occurred.

- d. The units shall be tied into the building's FX DDC control system for occupied/unoccupied cycle operation. All setpoints will be adjustable from the FX front-end.
- e. Occupied Period: During the occupied period, the supply fan will run continuously and indicate to the DDC controller via a current relay wired to a binary input of the controller that the fan is running. Once the fan is proven running, the outside air damper shall modulate open to minimum position (adjustable), to provide the minimum required volumetric flow rate of outside air. Whenever the space temperature is below the space set point of 68°F (adjustable), the heating valve will be open to maintain the discharge air temperature at the discharge heating setpoint. The discharge air setpoint shall reset automatically between the discharge high limit of 100°F (adjustable) and low limit of 60°F (adjustable) reset based on deviation of the space temperature from the space heating setpoint. As the space temperature rises above the space set point (adjustable), the outside air damper shall modulate open beyond their minimum position, up to 100% to maintain the cooling space setpoint. The controller's program will maintain a minimum discharge temperature of 60°F (adjustable) by enabling the heating and modulating the outside air damper, beyond the minimum position required volumetric flow rate of outside air, in sequence without overlap, to maintain the minimum discharge temperature of 60°F (adjustable).
- f. During the unoccupied cycle the unit's supply fan shall be cycled to maintain space setback temperature set point. The heating valve will be modulated to maintain the night heating setpoint. The outside air dampers shall be closed.
- g. All outside air dampers shall fail in the closed position.
- h. For any new units that have existing, or new auxiliary finned tube radiation as shown on the plans, a dedicated control signal from the DDC controller will cycle a new auxiliary radiation control valve (provided by ATC contractor and installed by Mechanical Contractor) to maintain the space setpoint. A lower setpoint will be maintained during the unoccupied cycle. For hot water applications, the ftr control valve will be 2-position. For steam applications, the ftr control valve will be modulating control, temperature rated for steam.

5. New Cabinet Heaters without outside air:

- a. This sequence is only for Cabinet Heaters that have no outside air. The ATC contractor shall supply and install all required FX BACnet PCG DDC controllers, controls and required hardware to allow the following sequences of operation to occur. Each unit shall have a TE-6314P-1 space sensor. *If the factory provided 'canned application program' does not exactly meet the sequence as provided below, the ATC sub-contractor will create a customized program specifically meeting all aspects of the sequence provided below.*
- b. A new DDC actuated heating control valve will be provided by the ATC contractor for installation by the Mechanical Contractor.
- c. The FX front-end will index unit's controller between occupied and unoccupied cycles. All setpoints shall be adjustable from the front-end.
- d. During the occupied cycle, the DDC controller will cycle the supply fan and the heating valve to maintain the space setpoint of 68°F (adjustable).
- e. During the unoccupied cycle, the fan and heating valve will be cycled by the DDC controller as needed to maintain a lower night set point of 60°F (adjustable).

6. New Convectors / Finned Tube Radiation Sections:

- a. The ATC contractor shall supply and install all required DDC controllers, controls and required hardware to allow the following sequences of operation to occur.
- b. Individual DDC zone valves located on baseboard or convector radiation loops shall be controlled by a Johnson TE-6314P-1 DDC space sensor which opens the new electronic valve

upon a call for heat. The valve shall close when the space sensor is satisfied. For steam applications, the ftr control valve will be modulating control, temperature rated for steam.

- c. The sensor shall be capable of maintaining an occupied and unoccupied setpoint. All setpoints shall be adjustable from the front-end.

7. New Relief Hoods / motorized dampers:

- a. As shown on the plans, relief dampers/hoods shall have motor operated dampers that shall parallel the position of the outside air damper of the associated UV/CUH.
- b. For fresh air motorized dampers that are serving more than one equipment, the motorized damper will open when any of the equipment served is in day mode and the fan status proven running.

8. New Exhaust Fans

- a. The ATC contractor shall supply and install all required DDC controllers, controls and required hardware to allow the following sequences of operation to occur.
- b. The fan will run continuously during the occupied mode and be off during the unoccupied mode. Fan status will be monitored at the BMS.

9. Dynamic Color Graphics Requirements

- a. The color graphics that the user will see to operate the system shall be resident in the FX web-based front-end. The main graphic shall be a three-dimensional floor plan of the building with links to each room and its HVAC system. The display will provide links to all DDC equipment in the building. Links to data trends and schedules shall be located on each system's graphic screen.
- b. Existing graphics will be modified and updated to provide a single floorplan for each floor of the respective building showing all new and existing equipment on the same floorplan.
- c. The minimum point information that is to be mapped to the front-end panel and shown in the color graphic screens is as follows:

Unit Ventilators/CUH with Outside Air				
Description	Point	History	Alarm	Totalize
Damper Command	AO	X		
Discharge Air Temperature	AI	X	X	
Discharge Low Limit Set Point	AV	X		
Heating Valve Command	AO	X		
Minimum Outdoor Air Damper Position (adjustable)	AV	X		
Occupied Command	BV			
Occupied Space Temp Set Point	AV	X		
Occupied Status	BV	X		
Outside Air Temperature	AI	X		
Space Temperature	AI	X	X	
Status of DDC controller	BV		X	
Supply Fan Command	BO	X	X	
Supply Fan Speed	AO	X	X	
Supply Fan Status	BI	X	X	X
Unoccupied Space Set Point	AV	X		
Status of DDC controller	BV		X	

Pump Control				
Description	Point	History	Alarm	Totalize
Outside Air Temperature	AV	X		
Pump Start/Stop	BO	X	X	
Pump Status	BI	X	X	X
Pump Alarm	BV		X	
Pump Alarm Reset	BI	X		
Pump OA Lockout Setpoint (Day)	AV	X		
Pump OA Lockout Setpoint (Night)	AV	X		
Pump Zone Occupied Command	BV			
Pump Zone Occupied Status	BV	X		
Status of DDC controller	BV		X	

CUH (without Outside Air)				
Description	Point	History	Alarm	Totalize
Space Temperature	AI	X	X	
Unoccupied Space Set Point	AV	X		
Occupied Space Set Point	AV	X		
Working Setpoint	AV	X		
Heating Valve	BO	X		
Supply Fan Command	BO	X	X	
Occupied Command	BV			
Occupied Status	BV	X		
Status of DDC controller	BV		X	

Finned Tube Radiation / Convectors				
Description	Point	History	Alarm	Totalize
Space Temperature	AI	X	X	
Unoccupied Space Set Point	AV	X		
Occupied Space Set Point	AV	X		
Working Setpoint	AV	X		
Heating Command	BO	X		
Occupied Command	BV			
Occupied Status	BV	X		
Status of DDC controller	BV		X	

Exhaust Fans				
Description	Point	History	Alarm	Totalize
Fan Command	BO	X	X	
Fan Status	BI	X		
Occupied Command	BV			
Occupied Status	BV	X		
Status of DDC controller	BV		X	

Section 3 – Historical Data Trending Requirements

All points indicated will be trended in the DDC front-end to record historical data for a period of 7 days, trended once per hour. The District intends to track these data for improving efficiency and occupancy conditions.

Section 4 – Hardware requirements:

A. General Description:

1. The Building Automation System (BAS) shall use an open architecture and where applicable support a multi-vendor environment. To accomplish this effectively, the BAS shall not be limited to a single open communication protocol standard, but to also integrate third-party devices and applications via additional protocol and through the latest software standards. The system configuration shall be available for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.
2. The Building Automation System shall consist of the following:
 - a. DDC Controllers (HVAC, etc.)
 - b. Input, Output Modules
 - c. Local Display Devices
 - d. Portable Operator's Terminals – Portable PC's
 - e. Distributed User Interfaces
 - f. Network processing, data storage and communications equipment
 - g. Other components required for a complete and working BAS
3. The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.
4. The system architectural design shall eliminate dependence upon any single device for alarm generation and control execution. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.
5. Acceptable Systems
 - Facility Explorer by Johnson Controls
 - Others per addendum

B. BAS Architecture – Automation Network

1. The automation network shall be configured as a Client/Server network with a web server operating on the Client's LAN/WAN. The web browser interface is extended over the LAN/WAN. Monitoring and control of the BAS is available using the web browser interface.
2. The automation network shall include the option of a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.
3. The BAS shall network multiple user interface clients, system controllers and systems supervisors as required for systems operation.
4. The automation network option shall be capable of operating at a communication speed of 100 Mbps.
5. The automation network option will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.

C. BAS Architecture – Control Network

1. Network Automation Controllers, LP-FX80, (NAC) shall provide management over the control network(s) and shall support the following communications protocols:
 - BACnet® Standard (ANSI/ASHRAE Standard 135-) MS/TP master.
 - LONWORKS® enabled devices using the free topology transceiver (FTT-1x).
 - Johnson Controls® N2 Open.
 - Modbus RTU and Modbus TCP.
2. The NAC shall be BTL (BACnet Testing Laboratories) listed as B-BC (BACnet Building Controller) and support the following data link options:
 - BACnet Internet Protocol (IP) (Annex J).
 - BACnet IP (Annex J) Foreign.

ISO 8802-3, Ethernet (Clause 7).

3. Control networks shall provide either "Peer-to-Peer," Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.
4. Digital Controllers shall reside on the control network.
5. A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided for each controller device (master or slave) that will communicate on the BACnet MS/TP Bus.
6. The PICS shall be submitted 10 days prior to bidding.

D. User Interface – Browser Based Interface

1. The system shall be capable of supporting an unlimited number of clients using standard Web browser such as Internet Explorer™ or Mozilla Firefox™. Systems requiring additional software (to enable a standard Web browser) to be resident on the client machine, or manufacture-specific browsers shall not be acceptable.
2. The Web browser software shall run on any operating system and system configuration that is supported by the Web browser. Systems that require specific machine requirements in terms of processor speed, memory, etc., in order to allow the Web browser to function with the Building Automation System (BAS), shall not be acceptable.
3. The Web browser client shall support at a minimum, the following functions:
 - a. User log-on identification and password shall be required. If an unauthorized user attempts access, notice of access failure shall be displayed. Security using authentication and encryption techniques to prevent unauthorized access shall be implemented.
 - b. HTML programming shall not be required to display system graphics or data on a Web page. HTML editing of the Web page shall be allowed if the user desires a specific look or format.
 - c. Storage of the graphical screens shall be in the Network Automation Controller (NAC) or the server, without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.
 - d. Real-time values displayed on a Web page shall update automatically without requiring a manual "refresh" of the Web page.
 - e. Users shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:
 - f. Modify common application objects, such as schedules and setpoints in a graphical manner.
 - g. Commands binary objects to start and stop.
 - h. View logs and charts.
 - i. View alarms.
4. Graphic screens on the Web Browser client shall support hypertext links to other locations on the Internet or on Intranet sites, by specifying the Uniform Resource Locator (URL) for the desired link.

E. User Interface – Alarms

1. Alarm feature shall allow user configuration of criteria to create, route, and manage alarms and events. It shall be possible for specific alarms from specific points to be routed to specific alarm recipients. The alarm management portion of the user interface shall, at the minimum, provide the following functions:
 - a. Allow configuration to generate alarms on any numeric, binary, or data point in the system.
 - b. Generate alarm records that contain a minimum of a timestamp, original state, acknowledged state, alarm class and priority.
 - c. Allow the establishment of alarm classes that provide the routing of alarms with similar characteristics to common recipients.
 - d. Allow a user, with the appropriate security level, to manage alarms - including sorting, acknowledging, and tagging alarms.

F. User Interface – Reports and Summaries

1. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:
 - a. All points in the BAS
 - b. All points in each BAS application
 - c. All points in a specific controller
 - d. All points in a user-defined group of points
 - e. All points currently in alarm
 - f. All BAS schedules
 - g. All user defined and adjustable variables, schedules, interlocks and the like
2. Reports shall be exportable to .pdf, .txt, or .csv formats.
3. The system shall allow for the creation of custom reports and queries.

G. User Interface – Schedules

1. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:
 - a. Regular schedules
 - b. Repeating schedules
 - c. Exception Schedules
2. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.
3. It shall be possible to define one or more exception schedules for each schedule including references to calendars.
4. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days. Holidays and special days shall be user-selected with the pointing device or keyboard.

H. User Interface - Passwords

1. Multiple-level password access protection shall be provided to allow the system manager to assign user interface control, display, and database manipulation capabilities deemed appropriate for each user based on an assigned password.
2. Each user shall have the following: a username, a password, and access levels.
3. The system shall provide the capability to require a password of minimum length and require a combination of characters and numerical or special characters.
4. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.
5. The system shall provide unlimited flexibility with access rights. A minimum of four levels of access shall be provided along with the ability to customize the system to provide additional levels.
6. A minimum of 100 unique passwords shall be supported.
7. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.
8. The system shall automatically generate a report of log-on/log-off and system activity for each user.
9. All log data shall be available in .pdf, .txt, and .csv formats.

I. User Interface – Dynamic Color Graphics

1. The graphics application program shall be supplied as an integral part of the User Interface.
2. The graphics applications shall include a create/edit function and a runtime function. The system architecture shall support an unlimited number of graphics documents (graphic definition files) to be generated and executed.
3. The graphics shall be able to display real-time data that is acquired, derived, or entered.
4. Graphics runtime functions –Each graphic application shall be capable of the following functions:
5. All graphics shall be fully scalable
6. The graphics shall support a maintained aspect ratio.
7. Multiple fonts shall be supported.
8. Unique background shall be assignable on a per graphic basis.
9. Operation from graphics – It shall be possible to change values (setpoints) and states in systems controlled equipment within the Web browser interface.

10. Graphic editing tool – A graphic editing tool shall be provided that allows for the creation and editing of graphic files. The graphic editor shall be capable of performing/defining all runtime binding.

J. Historical Data Collection

1. All numeric, binary or data points in the system database shall allow their values to be logged over time (trend log). Each historical record shall include the point's name, a time stamp including time zone, and the point's value.
2. The configuration of the historical data collection shall allow for recording data based on change of value or on a user-defined time interval.
3. The configuration of the historical data collection shall allow for the collection process to stop or rollover when capacity has been reached.
4. A historical data viewing utility shall be provided with access to all history records. This utility shall allow historical data to be viewed in a table or chart format.
5. The history data table view shall allow the user to hide/show columns and to filter data based on time and date. The history data table shall allow exporting to .txt, .csv, or .pdf file formats.
6. The historical data chart view shall allow different point histories to be displayed simultaneously, and also provide panning and zooming capabilities.

K. Audit Log

1. For each log entry, provide the following data:
 - a. Time and date
 - b. User ID
 - c. Change or activity: i.e., Change setpoint, add or delete objects, commands, etc.

L. Network Automation Controller (NAC) – LP-FX80

The NAC must provide the following hardware features as a minimum:

1. Memory
 - a. RAM Memory: 1GB DDR3 SD RAM
 - b. Flash Memory: 4GB flash total storage, 2 GB user storage
 - c. Expandable communications ports including LON, RS485, Modem, Wireless Terminal Equipment Control
 - d. All required protocol drivers as required by the sequence of operation.
2. Communications
 - a. Two 10/100 Mb Ethernet Port – RJ-45 connections
 - b. Two RS-485 ports
 - c. Expandable communications ports including LON, RS485, Modem, Wireless Terminal Equipment Control
 - d. All required protocol drivers as required by the sequence of operation.
3. Battery Backup
 - a. Battery backup provided for all on board functions including I/O
 - b. Battery is monitored and trickle charged
 - c. Battery maintains processor operation through power failures for a pre-determined interval, and then writes all data to flash memory, shuts the processor down, and maintains the clock for three months.
4. Environment
 - a. Must be capable of operation over a temperature range of -4°F to 140°F).
 - b. Must be capable of withstanding storage temperatures of between -40°F to 185°F).
 - c. Must be capable of operation over a humidity range of 5% to 95% RH, non-condensing
5. The Network Automation Controller (NAC) shall be a fully user-programmable device capable of providing all the capability described above.
6. Automation network – The Network Automation Controller (NAC) shall reside on the automation network. Each NAC shall support one or more sub-networks of controllers.
7. The Network Automation Controller shall have the capability to communicate directly with Modbus without the use of an additional gateway.

8. The Network Automation Controller shall have the capability to provide secure communications via SSL (Secure Socket Layer).
9. User Interface – Each Network Automation Controller (NAC) shall have the ability to deliver a web based user interface as previously described. All computers connected physically or virtually to the automation network shall have access to the web based UI.
10. Power Failure – In the event of the loss of normal power, The Network Automation Controller (NAC) shall continue to operate for a defined period after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software. Flash memory shall be incorporated for all critical controller configuration data.
11. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions.
12. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.
13. Certification – All controllers shall be listed by Underwriters Laboratories (UL).

M. Input Device Characteristics

- a. General Requirements: Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.
- b. Temperature Sensors: Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations. The temperature sensor shall be of the resistance type and shall be either two-wire 1000-ohm nickel RTD, or two-wire 1000-ohm platinum RTD.
- c. Room Temperature Sensors: Room sensors shall be constructed for either surface or wall box mounting.
- d. Thermo wells: When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure. Thermo wells and sensors shall be mounted in a threadolet or ½-inch NPT saddle and allow easy access to the sensor for repair or replacement. Thermo wells shall be constructed of 316 stainless steel.
- e. Outside Air Sensors: Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.
- f. Control Relays: Control pilot relays shall be of a modular plug-in design with retaining springs or clips. Mounting bases shall be snap-mount. DPDT, 3PDT, or 4PDT relays shall be provided as appropriate for application. Contacts shall be rated for 10 amps at 120 VAC. Relays shall have an integral indicator light and check button. Acceptable manufacturers: Idec, Functional Devices
- g. Electronic/Pneumatic Transducers: Electronic to Pneumatic transducers shall provide: Output: 3-15 psig,
- h. Input: 4-20 mA or 0-10 VDC, manual output adjustment, pressure gauge external replaceable supply air filter. Acceptable manufacturers: Johnson Controls, Mamac

N. APPLICATION SPECIFIC CONTROLLERS

- 1. General Purpose Programmable Controllers (PCG)**
 - a) The General Purpose Programmable Controller (PCG) shall be a fully user-programmable, digital controller that communicates via BACnet MS/TP protocol.
 - b) The PCG shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.
 - c) A BACnet Protocol Implementation Conformance Statement shall be provided for the PCG.
 - d) The Conformance Statement shall be submitted 10 days prior to bidding.
 - e) The PCG shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.
 - f) The PCG shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters

- appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable
- g) The PCG shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
 - h) The PCG shall include a removable base to allow pre-wiring without the controller.
 - i) The PCG shall include troubleshooting LED indicators to identify the following conditions:
 - i. Power On
 - ii. Power Off
 - iii. Download or Startup in progress, not ready for normal operation
 - iv. No Faults
 - v. Device Fault
 - vi. Field Controller Bus - Normal Data Transmission
 - vii. Field Controller Bus - No Data Transmission
 - viii. Field Controller Bus - No Communication
 - ix. Sensor-Actuator Bus - Normal Data Transmission
 - x. Sensor-Actuator Bus - No Data Transmission
 - xi. Sensor-Actuator Bus - No Communication
 - j) The PCG shall accommodate the direct wiring of analog and binary I/O field points.
 - k) The PCG shall support the following types of inputs and outputs:
 - l) Universal Inputs - shall be configured to monitor any of the following:
 - i. Analog Input, Voltage Mode
 - ii. Analog Input, Current Mode
 - iii. Analog Input, Resistive Mode
 - iv. Binary Input, Dry Contact Maintained Mode
 - m) Binary Inputs - shall be configured to monitor either of the following:
 - i. Dry Contact Maintained Mode
 - ii. Pulse Counter Mode
 - n) Analog Outputs - shall be configured to output either of the following
 - i. Analog Output, Voltage Mode
 - o) Analog Output, current Mode
 - p) Binary Outputs - shall output the following:
 - i. 24 VAC Triac
 - q) Configurable Outputs - shall be capable of the following:
 - i. Analog Output, Voltage Mode
 - ii. Binary Output Mode
 - r) The PCG shall have the ability to reside on a Field Controller Bus (FC Bus).
 - i. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
 - ii. The FC Bus shall support communications between the PCGs and the Supervisory Controller.
 - iii. The FC Bus shall also support Expansion I/O (PCX) communications with the PCG and with the Supervisory Controller.
 - s) The FC Bus shall operate at a maximum distance of 15,000 Ft. between the PCG and the furthest connected device.
 - t) The PCG shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus).
 - a) The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard Protocol SSPC-135, Clause 9.
 - b) The SA Bus shall support up to 10 devices per trunk.
 - c) The SA Bus shall operate at a maximum distance of 1,200 Ft. between the PCG and the furthest connected device.
 - u) The PCG shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the FC Bus or the SA Bus.
 - 2. The PCG shall support, but not be limited to, the following:
 - a) Chilled water/central plant automation applications including but not limited to:
 - i) the selection and sequencing of up to 8 chillers of different sizes
 - ii) the selection and sequencing of up to 8 (each) primary and secondary chilled water pumps of varying pump capacities
 - iii) the selection and sequencing of up to 8 condenser water pumps
 - iv) the selection and sequencing of cooling towers and bypass valve, including single speed, multi-speed, and Vernier control

- v) a proven and documented central cooling plant optimization program that incorporates custom equipment efficiency profiles, without rewriting software code, to meet the building load using the least amount of energy as calculated
- vi) the use of advanced control algorithms that apply equipment specific parameters, including operational limits and efficiency profiles, to determine equipment, start and runtime preferences
- vii) the identification of the most efficient equipment combination and automatic control of state and speed of all necessary equipment to balance runtime, optimize timing and sequencing and ensure the efficiency and stability of the central cooling plant
- viii) the control definition for the chiller plant in a single FX-PCG, as supported by available memory and point Input/Output (I/O), or capable of being split across multiple FX-PCGs
 - a) Heating central plant applications
 - b) Built-up air handling units for special applications
- 1. Terminal and packaged units
- 2. Special programs as required for systems control

2. Programmable Controller Expansion I/O Modules (PCX)

- a) The Programmable Controller Expansion I/O Module (PCX) provides additional inputs and outputs for use in the PCG.
- b) The PCX shall communicate with the PCG over the FC Bus or the SA Bus.
- c) The PCX shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.
- d) A BACnet Protocol Implementation Conformance Statement shall be provided for the PCG.
- e) The Conformance Statement shall be submitted 10 days prior to bidding.
- f) The PCX shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
- g) The PCX shall have a minimum of 4 points to a maximum of 17 points.
- h) The PCX shall support the following types of inputs and outputs:
 - i. Universal Inputs - shall be configured to monitor any of the following:
 - (i) Analog Input, Voltage Mode
 - (ii) Analog Input, Current Mode
 - ii. Analog Input, Resistive Mode
 - iii. Binary Input, Dry Contact Maintained Mode
 - iv. Binary Inputs - shall be configured to monitor either of the following:
 - (i) Dry Contact Maintained Mode
 - (ii) Pulse Counter Mode
 - v. Analog Outputs - shall be configured to output either of the following
 - (i) Analog Output, Voltage Mode
 - (ii) Analog Output, current Mode
 - vi. Binary Outputs - shall output the following:
 - (i) 24 VAC Triac
 - vii. Configurable Outputs - shall be capable of the following:
 - (i) Analog Output, Voltage Mode
 - (ii) Binary Output Mode
- 3. The PCX shall include troubleshooting LED indicators to identify the following conditions:
 - (i) Power On
 - (ii) Power Off
 - (iii) Download or Startup in progress, not ready for normal operation
 - (iv) No Faults
 - (v) Device Fault
 - (vi) Normal Data Transmission
 - (vii) No Data Transmission
 - (viii) No Communication

(END OF SECTION)

(END OF SECTION)

DIVISION 15 - MECHANICAL

SECTION 15990 - HVAC TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Scope: Extent of HVAC testing, adjusting and balancing work required by this Section is indicated on the drawings, in schedules, and by the requirements of this Section.
- B. Testing, Adjusting and Balancing (TAB) contractor to meet or exceed all uniform code testing requirements. (e.g. ASHRAE, ASME, IMC, Etc.)
- C. Systems: Testing, adjusting and balancing specified in this Section includes the following systems:
 - 1. Air systems including supply, return and exhaust.
 - 2. Hydronic systems including heating, chilled water.
- D. Related Sections: Refer to other Division 15 sections for:
 - 1. Fans
 - 2. Air Terminal Units
 - 3. Pumps
 - 4. Hydronic Piping Systems
 - 5. Ductwork
 - 6. Boilers
 - 7. Chillers and Cooling Towers

1.02 QUALITY ASSURANCE

- A. Agency Qualifications
 - 1. The qualifications of the TAB contracting firms shall be submitted, within 30 days of notice to proceed. Recent projects shall be listed and described for the company. Names and telephone numbers of the project contractors and facility managers will be provided.
 - 2. The Owner must approve in writing the qualifications of both the company and the lead technician.
 - 3. Qualifications of TAB Firm Personnel:
 - 1. A minimum of one professional engineer with current registration is required to be in the permanent employment of the firm for supervision and direction in the work performed. This engineer shall be totally responsible for developing job site data as required for test procedures.
 - 2. All personnel used on job site shall be either professional engineer or technicians, who shall have been permanent, full-time employees of firm for a

minimum of six (6) months prior to start of work for that specified project.

3. The qualifications of the TAB lead site technician who will remain on site during all TAB work, within 30 days of notice to proceed. Recent projects shall be listed and described for the company. Names and telephone numbers of the project contractors and facility managers will be provided.
 4. The Owner must approve in writing the qualifications of both the company and the lead technician.
- B. Tester's Qualifications: A specialist certified by the National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) with at least 3 years of experience in those testing, adjusting and balancing requirements similar to those required for this project, who is not the installer of the system to be tested and is otherwise independent of the project.
- C. Codes and Standards: Provide testing, adjusting and balancing conforming to American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), American National Standards Institute (ANSI), and either NEBB or AABC the following:
1. American National Standards Institute (ANSI): Comply with the following:
 - a. S1.4 Specification For Sound Level Meters
 - b. S1.11 Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters
 2. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE): Comply with ASHRAE recommendations pertaining to measurements, instruments, and testing, adjusting, and balancing.
 3. NEBB or AABC: Comply with NEBB'S "Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems" or comply with AABC MN-1 "National Standards," as applicable to mechanical air and hydronic distribution systems, and associated equipment and apparatus.
- D. Calibration of Testing Instruments: All measurement instruments used for testing, adjusting, balancing, and commissioning shall be calibrated. The time between the most recent calibration data and the final test report date shall not be over 1 year.

1.03 SUBMITTALS

- A. Test Reports: Provide certified test reports, signed by the test and balance supervisor who performed the work. The final reports shall include identification and types of instruments used, and their most recent calibration date and calibration date.

- B. Standards: Deliver a copy of either NEBB or AABC standards for testing and balancing work associated with the project. This document shall serve as specific guidance to balancers as to minimum requirements.
- C. Maintenance Data: Include, in maintenance manuals, copies of balance test reports and identification of instruments.
- D. Qualifications: Submit the individual qualifications of all persons responsible for supervising and performing the actual work.

1.04 AGENDA

- A. Agenda: A preliminary report and agenda shall be submitted and approved prior to the start of testing and balancing work.
 - 1. Review Drawings and Specifications prior to installation of any of the affected systems, and submit a report indicating any deficiencies in the systems that would preclude the proper adjusting, balancing, and testing of the systems.
 - 2. The agenda shall include a general description of each air and water system with its associated equipment and operation cycles for heating, intermediate, and cooling.
 - 3. The agenda shall include a list of all air and water flow and air terminal measurements to be performed.
 - 4. The agenda shall incorporate the proposed selection points for sound measurements, including typical spaces as well as sound sensitive areas.
 - 5. The agenda shall also include specific test procedures and parameters for determining specified quantities (e.g. flow, drafts, sound levels) from the actual field measurements to establish compliance with contract requirements. Samples of forms showing application of procedures and calculations to typical systems shall be submitted.
 - 6. Specific test procedures for measuring air quantities at terminals shall specify type of instrument to be used, method of instrument application (by sketch) and factors for:
 - a. Air terminal configuration.
 - b. Flow direction (supply or exhaust).
 - c. Velocity corrections.
 - d. Effective area applicable to each size and type of air terminal.
 - e. Density corrections.
 - 7. The agenda shall include identification and types of measurement instruments to be used, and their most recent calibration date and calibration date.

1.05 JOB CONDITIONS

- A. General: Do not proceed with testing, adjusting and balancing work until the following conditions have been met.
 - 1. Work has been completed and is operable. Ensure that there is no latent residual work yet to be completed on the tested equipment.
 - 2. Work scheduled for testing, adjusting and balancing is clean and free from debris, dirt and discarded building materials.
 - 3. All architectural openings (doors, windows, and other openings) which may affect the operation of the system to be tested, adjusted, and balanced shall at their normal states.
 - 4. All related mechanical systems which may affect the operation of the system to be tested, adjusted, and balanced shall be at their normal operating conditions. Coordinate tests with Controls Contractor.
 - 5. Air handling unit filters are not "loaded"; Mechanical Contractor shall replace, if required, prior to balancing.

PART 2 - PRODUCTS

2.01 PATCHING MATERIALS

- A. Material: Seal, patch and repair ductwork, piping and equipment drilled or cut for testing purposes.
 - 1. Plastic plugs with retainers may be used to patch drilled holes in ductwork and housings.
 - 2. Piping shall be capped with materials the same as the piping system.
 - 3. Insulation shall be neatly hemmed with metal or plastic

2.02 TEST INSTRUMENTS

- A. Standards: Utilize instruments and equipment of type, precision, and capacity as recommended in the following standards:
 - 1. NEBB "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
 - 2. AABC Manual MN-1, "AABC National Standards".
- B. Test Instruments: All instruments used for measurements shall be accurate and calibration histories for each instrument shall be available for examination. Each test instrument shall be calibrated by an approved laboratory or by the manufacturer. Owner's representative has the right to request instrument recalibration, or the use of other instruments and test methodology, where accuracy of readings is questionable.

- C. Additional Instruments: Permanently installed measuring instruments , such as temperature and pressure gauges, shall be checked against transfer standard instruments. Any instrument which does not meet specification requirement shall be replaced or recalibrated.
- D. Cone Instruments: Employ manufactured enclosure type cones, capable of air volume direct readings, for all diffuser air flow measurements. The readout meters shall meet calibration requirements.

PART 3 - EXECUTION

3.01 PROCEDURES AND INSTRUMENTS, GENERAL

- A. Requirements: All systems and components thereof shall be adjusted to perform as required by drawings and specifications.
- B. Test Duration: Operating tests of heating and cooling coils, fans, and other equipment shall be of not less than four hours duration after stabilized operating conditions have been established. Capacities shall be based on temperatures and air and water quantities measured during such tests.
- C. Instrumentation: Method of application of instrumentation shall be in accordance with the approved agenda.
 - 1. All instruments shall be applied in accordance with the manufacturer's certified instructions.
 - 2. All labor, instruments, and appliances required shall be furnished by the balancer. Permanently installed instruments used for the tests (e.g., flow meters and Btu meters) shall not be installed until the entire system has been cleaned and ready for operation.

3.02 AIR SYSTEM PROCEDURES

- A. Adjustments: Adjust all air handling systems to provide approximate design air quantity to or through, each component, and to maintain stable and comfortable interior temperatures, free of drafts or stagnant conditions. Adjusting and balancing of all systems shall be conducted during periods of the year approximating maximum seasonal operation. Verify operating parameters prior to start of balancing. Laboratory doors shall be closed and fume hood sashes full open, and all other ancillary systems in simultaneous operation. Coordinate with automatic control system operation.
- B. Balance: Flow adjusting (volume control) devices shall be used to balance air quantities (i.e., proportion flow between various terminals comprising system) to the extent that their adjustments do not create objectionable air motion or sound (i.e., in excess of specified limits).

1. Balancing between runs (submains, branch mains, and branches) generally shall be accomplished by flow regulating devices at, or in, the divided-flow fitting.
 2. Restriction imposed by flow regulating devices in or at terminals shall be minimal. Final measurements of air quality shall be made after the air terminal has been adjusted to provide the optimum air patterns of diffusion.
- C. Fan Adjustment: Total air system quantities, generally, shall be varied by adjustment of fan speeds or axial-flow fan wheel blade pitch. Damper restriction of a system's total flow may be used only for systems with direct-connected fans (without adjustable pitch blades), provided system pressure is less than 1/2-inch W.G. and sound level criteria is met.
- D. Air Measurement: Where air quantity measuring devices are specified in other sections such systems shall be used as a cross-check of portable measuring equipment.
1. Except as specifically indicated herein, pitot tube traverses shall be made of each duct to measure air flow therein. Pitot tubes, associated instruments, traverses, and techniques shall conform to the ASHRAE "Handbook Fundamentals Inch Pound Edition."
 2. For ducts serving modular office areas with movable partitions, which are subject to change, pitot tube traverses may be omitted provided the duct serves only a single room or space and its design volume is less than 2000 cfm. In lieu of pitot tube traverses, air flow in the duct shall be determined by totalling volume of individual terminals served, measured as described herein.
 3. Where duct's design velocity and air quantity are both less than 1000 (fpm/cfm), air quantity may be determined by measurements at terminals served.
- E. Test Holes: Test holes shall be in a straight duct, as far as possible downstream from elbows, bends, take-offs, and other turbulence generating devices, to optimize reliability of flow measurements.
- F. Air Terminal Balancing: Generally, measurement of flow rates by means of velocity meters applied to individual terminals, with or without cones or other adapters, shall be used only for balancing. Measurement of air quantities at each type of air terminal (inlet and outlet) shall be determined by the method approved for the balancing agenda.
- G. Air Motion: Air motion and distribution shall be as specified and indicated on Drawings.

3.03 WATER SYSTEM PROCEDURES

- A. Adjustment: All heating, cooling and condensing water systems shall be adjusted to provide required quantity to or through each

component. Verify operating parameters prior to start of balancing.

- B. Metering: Water quantities and pressures shall be measured with calibrated meters.
 - 1. Venturi tubes, orifices, or other metering fittings and pressure gauges shall be used to measure water flow rates and balance systems. Systems shall be adjusted to provide the approved pressure drops through the heat transfer equipment (coils [except room units], converters, etc.) prior to the capacity testing.
 - 2. Where flow metering fittings are not installed, in air/water type heat transfer equipment, flow balance shall be determined by measuring the air side energy differential across the heat transfer equipment. Measurement of water temperature differential shall be performed with the air system, adjusted as described herein, in operation.
- C. Automatic Controls: Automatic control valves shall be positioned for full flow through the heat transfer equipment of the system during tests.
- D. Flow: Flow through bypass circuits at three-way valves shall be adjusted to equal that through the supply circuit, when the valve is in the bypass position.
- E. Distribution: Adjustment of distribution shall be effected by means of balancing devices (cocks, valves, and fittings) and automatic flow control valves as provided; service valves shall not be used.
 - 1. Where automatic flow control valves are utilized in lieu of Venturi tubes, only pressure differential need be recorded, provided that the pressure is at least the minimum applicable to the tag rating.
- F. Special Procedures: Where available pump capacity (as designed) is less than total flow requirements of individual heat transfer units of system served, full flow may be simulated by the temporary restriction of flow to portions of the system; specific procedures shall be delineated in the agenda.

3.04 HEAT EXCHANGER CAPACITY VERIFICATION

- A. Air coil capacities shall be verified from air side measurement data. Capacities of coils shall be the difference of the energy carried by the air between the up stream and down stream of the coils.
- B. The measured air flow rate for the fan may be used for air coil capacity calculations providing no ducted bypassing of coil is occurring.
- C. Capacity verifications shall be performed after air and water systems have been balanced. Heat exchangers using steam as the

exchange medium shall have the steam measured and adjusted to the specified pressure.

- D. False load shall be applied if the upstream air or water does not meet the specified conditions at the time of test.

3.05 REPORTS

- A. Submittals: Three copies of the reports described herein, covering air and water system performance, air motion (fpm), and sound pressure levels, shall be submitted prior to final tests and inspection.
- B. Instrument Records: Types, serial numbers, and dates of calibration of all instruments shall be included.
- C. Reports: Reports shall conspicuously identify items not conforming to contract requirements, or obvious malfunction and deficiencies.

3.06 AIR SYSTEM DATA

- A. Report: The report shall include for each air handling system the data listed below.

- 1. Equipment (Fan or Factory Fabricated Station Unit):

- a. Installation data

- 1. Manufacturer and model
 - 2. Size
 - 3. Arrangement, discharge and class
 - 4. Motor hp, voltage, phase, cycles, and full load amps
 - 5. Location and local identification data

- b. Design data

- 1. Data listed in schedules on drawings and specifications.

- c. Fan recorded (test) data

- 1. cfm
 - 2. Static pressure
 - 3. rpm
 - 4. Motor operating amps motor operating bhp

- 2. Duct Systems:

- a. Duct air quantities (maximum and minimum) - main, submains, branches, outdoor (outside) air, total air, and exhaust

- 1. Duct size(s)
 - 2. Number of Pitot tube (pressure measurements)

3. Sum of velocity measurements (Note: Do not add pressure measurements)
 4. Average velocity
 5. Recorded (test) cfm design cfm
- b. Individual air terminals
1. Terminal identification supply or exhaust, location and number designation
 2. Type size, manufacturer and catalog identification applicable factor for application, velocity, area, etc., and designated area
 3. Design and recorded velocities- fpm (state "core," "inlet," etc., as applicable)
 4. Design and recorded quantities -cfm deflector vane or diffusion cone settings

3.07 WATER SYSTEM DATA

A. Report: The certified report for each water system shall include the data listed below.

1. Pumps:

a. Installation data

1. Manufacturer and model
2. Size
3. Type drive
4. Motor hp, voltage, phase, and full load amps

b. Design data

1. gpm
2. Head
3. rpm, bhp, and amps

c. Recorded data

1. Discharge pressures (full-flow and no-flow)
2. Suction pressures (full-flow and no-flow) operating head
3. Operating gpm (from pump curves if metering is not provided) no-load amps (where possible)
4. Full-flow amps
5. No-flow amps

2. Air Heating and Cooling Equipment:

a. Design data

1. Load in Btu or MBh
2. gpm

3. Entering and leaving water temperature
4. Entering and leaving air conditions (DB and WB)
- b. Recorded data
 1. Type of equipment and identification (location or number designation)
 2. Entering and leaving air conditions (DB and WB)
 3. Entering and leaving water temperatures
3. Water Chilling Units:
 - a. Installation data
 1. Manufacturer and model
 2. Motor hp, voltage, cycles, phase, and full load amps
 3. Part load amperes
 4. gpm - chiller and condenser
 5. Water pressure drop - chiller and condenser
 6. Entering and leaving water temperature - chiller and condenser
 - b. Recorded data (chiller and condenser)
 1. gpm
 2. Water pressure drop
 3. Entering and leaving water temperature
 4. Amperes

3.08 FINAL COMMISSIONING TESTS, INSPECTIONS AND ACCEPTANCE

- A. Scope: Test shall be made to demonstrate that capacities and performance of air and water systems comply with contract requirements.
 1. At the time of final inspection, recheck random selection of data (water and air quantities, air motion, and sound levels) recorded in the balancing report. All laboratories shall be rechecked for satisfactory air flow and motion on vicinity of and through hoods.
 2. Points and areas for recheck shall be selected by the Owner's Representative.
 3. Measurement and test procedures shall be the same as approved for work forming basis of certified report.
 4. Selections for recheck (specific plus random), in general, will not exceed 25 percent of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.
- B. Retests: If random tests elicit a measured flow deviation of 10 percent or more from, or a sound level of 2 db or more greater than, that recorded in the report listings, as 10 percent or more of the rechecked selections, the report shall be automatically

rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, new certified reports submitted, and new inspection tests made, all at no additional cost.

- C. Marking of Settings: Following final acceptance of balance reports, the settings of all valves, splitters, dampers, and other adjustment devices shall be permanently marked so that adjustment can be restored if disturbed at any time. Devices shall not be marked until after final acceptance.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15995 MECHANICAL SYSTEMS COMMISSIONING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The purpose of this section is to specify Division 15 responsibilities in the commissioning process.
- B. The systems to be commissioned are listed in Section 01810 Commissioning.
- C. Commissioning requires the participation of Division 15 to ensure that all systems are operating in a manner consistent with the Contract Documents. The general commissioning requirements and coordination are detailed in Division 17. Division 15 shall be familiar with all parts of Division 17 and the commissioning plan issued by the CA and shall execute all commissioning responsibilities assigned to them in the Contract Documents.

1.02 RESPONSIBILITIES

- A. Mechanical, Controls and TAB Contractors. The commissioning responsibilities applicable to each of the mechanical, controls and TAB contractors of Division 15 are as follows (all references apply to commissioned equipment only):
 - 1. Construction and Acceptance Phases
 - a. Include and itemize the cost of commissioning in the contract price.
 - b. In each purchase order or subcontract written, include requirements for submittal data, commissioning documentation, O&M data and training.
 - c. Attend a commissioning scoping meeting and other meetings necessary to facilitate the Cx process.
 - d. Contractors shall provide the CA with normal cut sheets and shop drawing submittals of commissioned equipment.
 - e. Provide additional requested documentation, prior to normal O&M manual submittals, to the CA for development of start-up and functional testing procedures.
 - 1. Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and

checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Agent.

2. The Commissioning Agent may request further documentation necessary for the commissioning process.
 3. This data request may be made prior to normal submittals.
- f. Provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review and approval.
 - g. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
 - h. Provide limited assistance to the CA in preparing the specific functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
 - i. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the construction checklists from the CA for all commissioned equipment. Submit to CA for review and approval prior to startup. Refer to Section 01810 Commissioning for further details on start-up plan preparation.
 - j. During the startup and initial checkout process, execute the mechanical-related portions of the construction checklists for all commissioned equipment.
 - k. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
 - l. Address current A/E punch list items before functional testing. Air and water TAB shall be completed with discrepancies and problems remedied before functional testing of the respective air- or water-related systems.
 - m. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

- n. Provide skilled technicians to perform functional performance testing under the direction of the CA for specified equipment in Section 01810. Assist the CA in interpreting the monitoring data, as necessary.
- o. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, OR and A/E and retest the equipment.
- p. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
- q. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).
- r. Provide training of the Owner's operating staff using expert qualified personnel, as specified.
- s. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

2. Warranty Period

- a. Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
- b. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

B. Mechanical Contractor. The responsibilities of the HVAC mechanical contractor, during construction and acceptance phases in addition to those listed in (A) are:

- 1. Provide startup for all HVAC equipment, except for the building automation control system.
- 2. Assist and cooperate with the TAB contractor and CA by:
 - a. Putting all HVAC equipment and systems into operation and continuing the operation during each working day of TAB and commissioning, as required.
 - b. Including cost of sheaves and belts that may be required by TAB.
 - c. Providing test holes in ducts and plenums where directed by TAB to allow air measurements and air balancing. Providing an approved plug.
 - d. Providing temperature and pressure taps according to the Construction Documents for TAB and commissioning testing.

3. Install a P/T plug at each water sensor, which is an input point to the control system.
 4. List and clearly identify on the as-built drawings the locations of all airflow stations.
 5. Prepare a preliminary schedule for Division 15 pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the CA. Update the schedule as appropriate.
 6. Notify the OR or CA depending on protocol, when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and TAB will occur. Be responsible to notify the OR or CA, ahead of time, when commissioning activities not yet performed or not yet scheduled will delay construction. Be proactive in seeing that commissioning processes are executed and that the CA has the scheduling information needed to efficiently execute the commissioning process.
- C. Temperature Controls Contractor. The commissioning responsibilities of the Temperature Controls Contractor, during construction and acceptance phases in addition to those listed in (A) are:
1. Sequences of Operation Submittals. The Temperature Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. They shall include:
 - a. An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.
 - b. All interactions and interlocks with other systems.
 - c. Detailed delineation of control between any packaged controls and the building automation system, listing what points the BAS monitors only and what BAS points are control points and are adjustable.
 - d. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included, but will generally require additional narrative).
 - e. Start-up sequences.
 - f. Warm-up mode sequences.
 - g. Normal operating mode sequences.
 - h. Unoccupied mode sequences.
 - i. Shutdown sequences.
 - j. Capacity control sequences and equipment staging.

- k. Temperature and pressure control: setbacks, setups, resets, etc.
- l. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
- m. Effects of power or equipment failure with all standby component functions.
- n. Sequences for all alarms and emergency shut downs.
- o. Seasonal operational differences and recommendations.
- p. Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
- q. Schedules, if known.
- r. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections, unless the sections are numbered.

2. Control Drawings Submittal

- a. The control drawings shall have a key to all abbreviations.
- b. The control drawings shall contain graphic schematic depictions of the systems and each component.
- c. The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
- d. Provide a full points list with at least the following included for each point:
 - 1. Controlled system
 - 2. Point abbreviation
 - 3. Point description
 - 4. Display unit
 - 5. Control point or setpoint (Yes / No)
 - 6. Monitoring point (Yes / No)
 - 7. Intermediate point (Yes / No)
 - 8. Calculated point (Yes / No)
 - a. Key:
 - b. Point Description: DB temp, airflow, etc.
 - c. Control or Setpoint: Point that control equipment and can have its setpoint changed (OSA, SAT, etc.)

- d. Intermediate Point: Point whose value is used to make a calculation which then controls equipment (space temperatures that are averaged to a virtual point to control reset).
- e. Monitoring Point: Point that does not control or contribute to the control of equipment, but is used for operation, maintenance, or performance verification.
- f. Calculated Point: "Virtual" point generated from calculations of other point values.

The Temperature Controls Contractor shall keep the CA informed of all changes to this list during programming and setup.

3. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.
4. Assist and cooperate with the TAB contractor in the following manner:
 - a. Meet with the TAB contractor prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB. Provide the TAB any needed unique instruments for setting terminal unit boxes and instruct TAB in their use (handheld control system interface for use around the building during TAB, etc.).
 - b. For a given area, have all required construction checklists, calibrations, startup and selected functional tests of the system completed and approved by the CA prior to TAB.
 - c. Provide a qualified technician to operate the controls to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.
5. Assist and cooperate with the CA in the following manner:
 - a. Using a skilled technician who is familiar with this building, execute the functional testing of the controls system. Assist in the functional testing of all equipment. Provide two-way radios during the testing.
 - b. Execute all control system trend logs.
6. The Temperature Controls Contractor shall prepare a written plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional performance testing, according to the process in Section 01810 Commissioning. At minimum, the plan shall include for each type of equipment controlled by the automatic controls:
 - a. System name.

- b. List of devices.
 - c. Step-by-step procedures for testing each controller after installation, including:
 - 1. Process of verifying proper hardware and wiring installation.
 - 2. Process of downloading programs to local controllers and verifying that they are addressed correctly.
 - 3. Process of performing operational checks of each controlled component.
 - 4. Plan and process for calibrating valve and damper actuators and all sensors.
 - 5. A description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.
 - d. A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor or controller has "passed" and is operating within the contract parameters.
 - e. A description of the instrumentation required for testing.
 - f. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the CA and TAB contractor for this determination.
- 7. Provide a signed and dated certification to the CA and OR upon completion of the checkout of each controlled device, equipment and system prior to functional testing for each piece of equipment or system, that all system programming is complete as to all respects of the Contract Documents, except functional testing requirements.
 - 8. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as specified in Section 15950.
 - 9. List and clearly identify on the as-built duct and piping drawings the locations of all static and differential pressure sensors (air, water and building pressure).
- D. TAB Contractor. The duties of the TAB contractor, in addition to those listed in (A) are:
 - 1. Six weeks prior to starting TAB, submit to the OR the qualifications of the site technician for the project, including the name of the contractors and facility managers of recent projects the technician on which was lead. The Owner will approve the site technician's qualifications for this project.

2. Submit the outline of the TAB plan and approach for each system and component to the CA, OR and the Temperature Controls Contractor six weeks prior to starting the TAB. This plan will be developed after the TAB has some familiarity with the control system.
3. The submitted plan will include:
 - a. Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and contractors to sufficiently understand the design intent for each system.
 - b. An explanation of the intended use of the building control system. The Temperature Controls Contractor will comment on feasibility of the plan.
 - c. All field checkout sheets and logs to be used that list each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - e. Final test report forms to be used.
 - f. Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch / submain proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using air flow straighteners or relocating flow stations and sensors will be discussed. Provide the analogous explanations for the water side.
 - g. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - h. Details of how *total* flow will be determined (Air: sum of terminal flows via BAS calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations. Water: pump curves, circuit setter, flow station, ultrasonic, etc.).
 - i. The identification and types of measurement instruments to be used and their most recent calibration date.
 - j. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and provide methods to verify this.
 - k. Confirmation that TAB understands the outside air ventilation criteria under all conditions.

- l. Details of whether and how minimum outside air cfm will be verified and set, and for what level (total building, zone, etc.).
 - m. Details of how building static and exhaust fan / relief damper capacity will be checked.
 - n. Proposed selection points for sound measurements and sound measurement methods.
 - o. Details of methods for making any specified coil or other system plant capacity measurements.
 - p. Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.
 - q. Details regarding specified deferred or seasonal TAB work.
 - r. Details of any specified false loading of systems to complete TAB work.
 - s. Details of all exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - t. Details of any required interstitial cavity differential pressure measurements and calculations.
 - u. Plan for hand-written field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - v. Plan for formal progress reports (scope and frequency).
 - w. Plan for formal deficiency reports (scope, frequency and distribution).
4. A running log of events and issues shall be kept by the TAB field technicians. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the CA and OR at least twice a week.
 5. Communicate in writing to the Temperature Controls Contractor all setpoint and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.
 6. Provide a draft TAB report within two weeks of completion. A copy will be provided to the CA. The report will contain a full explanation of the methodology, assumptions and the results in a clear format with designations of all uncommon abbreviations and column headings. The report should follow the latest and most rigorous reporting recommendations by AABC, NEBB or ASHRAE Standard 111.
 7. Provide the CA with any requested data, gathered, but not shown on the draft reports.

8. Provide a final TAB report for the CA with details, as in the draft.
 9. Conduct functional performance tests and checks on the original TAB.
- E. Mechanical Designer. Refer to Section 01810 Commissioning for the (reference only) responsibilities of the mechanical designer.

1.03 RELATED WORK

- A. Refer to Section 01810 Commissioning, for a listing of all sections where commissioning requirements are found.
- B. Refer to Section 01810 Commissioning for systems to be commissioned and Section 01810 Commissioning.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. Division 15 shall provide all test equipment necessary to fulfill the testing requirements of this Division.
- B. Refer to Section 01810 Commissioning for additional Division 15 requirements.

PART 3 - EXECUTION

3.01 SUBMITTALS

- A. Division 15 shall provide submittal documentation relative to commissioning as required in this Section Part 1, Section 01300 and Section 01810 Commissioning.

3.02 STARTUP

- A. The HVAC mechanical and Temperature Controls Contractors shall follow the start-up and initial checkout procedures listed in the Responsibilities list in this section and in 17100. Division 15 has start-up responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the commissioning agent or Owner.
- B. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CA and OR. Beginning system testing before full completion, does not relieve the Contractor from fully completing the system, including all construction checklists as soon as possible.

3.03 TAB

- A. Refer to the TAB responsibilities in Part 1.2 above.

3.04 FUNCTIONAL PERFORMANCE TESTS

- A. Refer to Section 01810 Commissioning for a list of systems to be commissioned and for a description of the process.

3.05 TESTING DOCUMENTATION, NON-CONFORMANCE AND APPROVALS

- A. Refer to Section 01810 Commissioning for specific details on non-conformance issues relating to construction checklists and tests.
- B. Refer to Section 01810 Commissioning for issues relating to functional performance tests.

3.06 OPERATION AND MAINTENANCE (O&M) MANUALS

- A. The following O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.
- B. Division 15 shall compile and prepare documentation for all equipment and systems covered in Division 15 and deliver this documentation to the GC for inclusion in the O&M manuals, according to this section and Section 01730, prior to the training of owner personnel.
- C. The CA shall receive a copy of the O&M manuals for review.
- D. Special Control System O&M Manual Requirements. In addition to documentation that may be specified elsewhere, the Temperature Controls Contractor shall compile and organize at minimum the following data on the control system in labeled 3-ring binders with indexed tabs.
 - 1. Four copies of the controls training manuals in a separate manual from the O&M manuals.
 - 2. Operation and Maintenance Manuals containing:
 - a. Specific instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. These instructions shall be step-by-step. Indexes and clear tables of contents shall be included. The detailed technical manual for programming and customizing control loops and algorithms shall be included.
 - b. Full as-built set of control drawings (refer to Submittal section above for details).
 - c. Full as-built sequence of operations for each piece of equipment.
 - d. Full points list. In addition to the updated points list required in the original submittals (Part 1 of this section), a listing of all rooms shall be provided with the following information for each room:
 - 1. Floor
 - 2. Room number
 - 3. Room name
 - 4. Air handler unit ID
 - 5. Reference drawing number
 - 6. Air terminal unit tag ID

- 7. Heating and/or cooling valve tag ID
 - 8. Minimum cfm
 - 9. Maximum cfm
- e. Full print out of all schedules and set points after testing and acceptance of the system.
- f. Full as-built print out of software program.
- g. Electronic copy on disk of the entire program for this facility.
- h. Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.
- i. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
- j. Control equipment component submittals, parts lists, etc.
- k. Warranty requirements.
- l. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
- 3. The manual shall be organized and subdivided with permanently labeled tabs for each of the following data in the given order:
 - a. Sequences of operation
 - b. Control drawings
 - c. Points lists
 - d. Controller / module data
 - e. Thermostats and timers
 - f. Sensors and DP switches
 - g. Valves and valve actuators
 - h. Dampers and damper actuators
 - i. Program setups (software program printouts)
- 4. Field checkout sheets and trend logs should be provided to the CA for inclusion in the Commissioning Record Book.
- E. Special TAB Documentation Requirements. The TAB will compile and submit the following with other documentation that may be specified elsewhere in the *Specifications*.
 - 1. Final report containing an explanation of the methodology, assumptions, test conditions and the results in a clear format with designations of all uncommon abbreviations and column headings.
 - 2. The TAB shall mark on the drawings where all traverse and other critical measurements were taken and cross reference the location in the TAB report.
- F. Review and Approvals. Review of the commissioning related sections of the O&M manuals shall be made by the A/E and by the CA. Refer to Section 01810 Commissioning, Part 3.8 for details.

3.07 TRAINING OF OWNER PERSONNEL

- A. The GC shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed. Refer to Section 01810 Commissioning for additional details.
- B. The CA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment. Refer to Section 01810 Commissioning for additional details.
- C. Mechanical Contractor. The mechanical contractor shall have the following training responsibilities:
1. Provide the CA with a training plan two weeks before the planned training according to the outline described in Section 01810 Commissioning.
 2. Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of HVAC equipment including, but not limited to, pumps, boilers, furnaces, chillers, heat rejection equipment, air conditioning units, air handling units, fans, terminal units, controls and water treatment systems, etc.
 3. Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
 4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
 5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
 6. The Temperature Controls Contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
 7. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
 8. Training shall include:
 - a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.

- b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
 - c. Discussion of relevant health and safety issues and concerns.
 - d. Discussion of warranties and guarantees.
 - e. Common troubleshooting problems and solutions.
 - f. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
 - g. Discussion of any peculiarities of equipment installation or operation.
 - h. The format and training agenda in *The HVAC Commissioning Process, ASHRAE Guideline 1-1989R*, 1996 is recommended.
 - i. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.
- 9. Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
 - 10. The mechanical contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not *controlled* by the central control system.
 - 11. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.
 - 12. Duration of Training. The mechanical contractor shall provide training on each piece of equipment according to the following schedule.

<u>Hours</u>	<u>System</u>
<u>8</u>	Chillers and System
<u>8</u>	Boilers and System
<u>3</u>	Piping Systems
<u>4</u>	Chemical Treatment
<u>12</u>	Air Handler Units
<u>1</u>	Spot Unit Heaters
<u>2</u>	Air Terminal Units
<u>1</u>	Central Exhaust Systems
<u>2</u>	Supplementary Fans
<u>2</u>	Pumps
<u>16</u>	Controls System
<u>16</u>	Control system Follow-up
<u>4</u>	Humidifiers
<u>4</u>	Water Heaters

D. Temperature Controls Contractor. The Temperature Controls Contractor shall have the following training responsibilities:

1. Provide the CA with a training plan four weeks before the planned training according to the outline described in Section 01810 Commissioning, Part 3.9.
2. The Temperature Controls Contractor shall provide designated Owner personnel training on the control system in this facility. The intent is to clearly and completely instruct the Owner on all the capabilities of the control system.
3. Training manuals. The standard operating manual for the system and any special training manuals will be provided for each trainee, with three extra copies left for the O&M manuals. In addition, copies of the system technical manual will be demonstrated during training and three copies submitted with the O&M manuals. Manuals shall include detailed description of the subject matter for each session. The manuals will cover all control sequences and have a definitions section that fully describes all relevant words used in the manuals *and* in all software displays. Manuals will be approved by the CA. Copies of audiovisuals shall be delivered to the Owner.
4. The trainings will be tailored to the needs and skill-level of the trainees.
5. The trainers will be knowledgeable on the system and its use in buildings. For the on-site sessions, the most qualified trainer(s) will be used. The Owner shall approve the instructor prior to scheduling the training.
6. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
7. The Temperature Controls Contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
8. There shall be three training sessions:
 1. Training I. Control System. This training may be held on-site or in the supplier's facility. If held off-site, the training may occur prior to final completion of the system installation. Upon completion, each student, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
 2. Training II. Building Systems. The second session shall be held on-site and will consist of actual hands-on training after the completion of system

commissioning. The session shall include instruction on:

- a. Specific hardware configuration of installed systems in this building and specific instruction for operating the installed system, including HVAC systems, lighting controls and any interface with security and communication systems.
 - b. Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing set points and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
 - c. All trending and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends. Trainees will actually set-up trends in the presence of the trainer.
 - d. Every screen shall be completely discussed, allowing time for questions.
 - e. Use of keypad or plug-in laptop computer at the zone level.
 - f. Use of remote access to the system via phone lines or networks.
 1. Setting up and changing an air terminal unit controller.
 2. Graphics generation
 3. Point database entry and modifications
 4. Understanding DDC field panel operating programming (when applicable)
3. Training III. The third training (Follow-up Training) will be conducted on-site six months after occupancy. The session will be structured to address specific topics that trainees need to discuss and to answer questions concerning operation of the system.

E. TAB The TAB contractor shall have the following training responsibilities:

1. TAB shall meet for 2 hours with facility staff after completion of TAB and instruct them on the following:
 - a. Go over the final TAB report, explaining the layout and meanings of each data type.

- b. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
- c. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
- d. Discuss any temporary settings and steps to finalize them for any areas that are not finished.
- e. Other salient information that may be useful for facility operations, relative to TAB.

3.08 DEFERRED TESTING

- A. Refer to Section 01810 Commissioning, Part 3.10 for requirements of deferred testing.

3.09 WRITTEN WORK PRODUCTS

- A. Written work products of Contractors will consist of the start-up and initial checkout plan described in Section 01810 Commissioning and the filled out start-up, initial checkout and construction checklists.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15997 MECHANICAL TESTING REQUIREMENTS

PART 1 - GENERAL

1.01 INCLUDED SYSTEMS AND EQUIPMENT

- A. The following is a partial list of the equipment and system test requirements included in this section:

1. Air handler systems
2. Building management control system & energy management
3. Hydronic piping and HVAC Pumps
4. Exhaust fans
5. Indoor air climate control--misc. systems
6. Indoor air quality (IAQ)
7. Terminal unit
8. Test and balance (TAB) work
9. Air Conditioning Equipment

1.02 DESCRIPTION

- A. This section specifies the functional testing requirements for Division 15 systems and equipment. From these requirements, the Commissioning Authority (CA) shall develop step-by-step procedures to be executed by the Subs or the Commissioning Authority. The general functional testing process, requirements and test method definitions are described in Section 01810 Commissioning. The test requirements for each piece of equipment or system contain the following:

1. The contractors responsible to execute the tests, under the direction of the CA.
2. A list of the integral components being tested.
3. Construction checklists associated with the components.
4. Functions and modes to be tested.
5. Required conditions of the test for each mode.
6. Special procedures.
7. Required methods of testing.
8. Required monitoring.
9. Acceptance criteria.
10. Sampling strategies allowed.

1.03 PREREQUISITES

- A. The following applicable generic prerequisite checklist items are required to be listed on each written functional test form and be completed and checked off by CA prior to functional testing.
- B. All related equipment has been started up and start-up reports and construction checklists submitted and approved ready for functional testing.
- C. All control system functions for this and all interlocking systems are programmed and operable per contract documents,

including final set points and schedules with debugging, loop tuning and sensor calibrations completed.

1. Piping system flushing complete and required report approved.
2. Water treatment system complete and operational.
3. Vibration control report approved (if required).
4. Test and balance (TAB) complete and approved for the hydronic system.
5. All A/E punch list items for this equipment corrected. These functional test procedures reviewed and approved by installing contractor.
6. Safeties and operating ranges reviewed by the CA.
7. Test requirements and sequences of operation attached.
8. Schedules and set points attached.
9. False loading equipment, system and procedures ready.
10. Sufficient clearance around equipment for servicing.
11. Record of all values for pre-test set points changed to accommodate testing has been made and a check box provided to verify return to original values (control parameters, limits, delays, lockouts, schedules, etc.).
12. Other miscellaneous checks of the pre-functional checklist and start-up reports completed successfully.

1.04 MONITORING

- A. Monitoring is a method of testing as a stand-alone method or to augment manual testing.
- B. All points listed in the required monitoring section of the test requirements which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using data loggers. At the option of the CA, some control system monitoring may be replaced with data logger monitoring. At the CA's request, the Temperature Controls Contractor shall trend up to 20% more points than listed herein at no extra charge.
- C. Hard copies of monitored data must be in columnar format with time down the left column and at least 5 columns of point values on the same page.
- D. Graphical output is desirable, and will be required for all output, if the system can produce it.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

The following Sample test procedures are representative of the level of detail required for this project. The Owner reserves the right to work with the Contractor to amend these data sheets as necessary at no extra cost to the Owner.

3.01 AIR HANDLER UNITS (AHU / RTU)

A. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls to activate the equipment as needed.
2. CA: to witness, direct and document testing.

B. Integral Components or Related Equipment Being Tested

Construction Checklist ID PC-_____

PC-_____

1. AHU/RTU and components (fans, coils, valves, ducts, VFD)
2. Heat recovery coil, humidifier or evaporative cooling sections.

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Functions/Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

The following testing requirements are an addition to and do not replace any testing requirements elsewhere in this Division.

Replace any existing requirements elsewhere in this Division.		
<u>Function / Mode</u>	<u>Test Method</u> Manual, Monitoring, Either or Both ³	<u>Required Seasonal Test</u> ¹
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, shutdown, unoccupied & manual modes and power failure. Test functionality of this piece of equipment or system in all control strategies or interlocks with which it is associated.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Mixed & supply air, & reset temperature control functions.	Both	
3. Economizer functions.	Both	Cooling
4. SF, and exhaust fan interlocks.	Either	
5. No CCV flow when there is HCV flow.	Both	
6. CCV & HCV modulation & positive shutoff (no leak-thru).	Manual	
7. Duct static pressure (SP) control.	Both	
8. Exhaust fan tracking and building SP.	Monitoring	

<u>Function / Mode</u>	<u>Test Method</u> Manual, Monitoring, Either or Both ³	<u>Required Seasonal Test</u> ¹
9. VFD (or inlet vanes) operation on SF and RF: modulation to minimum, control system PID, proportional band of speed vs controlling parameter, constancy of static pressure, verification of program settings, alarms, etc.	Both	²
10 Damper interlocks and correct modulation in all . modes, including smoke and fire dampers.	Manual	
11 Temperature difference across HC & CC per . specifications.	Manual	
12 Verification of minimum OSA control through . varying VAV box positions.	Either	²
13 Heating and cooling coils freeze protection. .	Manual	²
14 Branch duct control damper control. .	Manual	
15 Night low limit, morning warm-up cycle. .	Either	
16 Heat recovery operation. .	Monitoring	
17 Verify TAB reported SF cfm with control system . reading.	Manual	²
18 All alarms (low limits, high static, etc.). .	Manual	
19 Heating and cooling coil capacity test, optional. .	Manual	Design
20 Sensor and actuator calibration checks: on duct . static pressure sensor on SAT, MAT, OSAT, OSA & RA damper and valve positions, SF cfm reading with TAB, and other random checks (EMS readout against hand-held calibrated instrument or observation must be within specified tolerances)	Manual	
21 Verify schedules and setpoints to be reasonable . and appropriate		

¹Cooling season, Heating season or Both. "Design" means within 5% of season design (ASHRAE 2 1/2%), or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.

²Seasonal test not required if seasonal conditions can be adequately simulated.

³Refer to Special Procedures

E. Special Procedures (other equipment to test with, etc.; reference to function ID)

1. Reduced Testing for Smaller Units. For standard application AHU's less than 15 tons, the following modifications to the testing requirements apply: 1) either Manual or Monitoring will satisfy the verification

requirement--where both is listed, choose one. 2) Testing Modes 6, 8, 11, 13 and 16 is not required.

F. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using data loggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min .)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
For each AHU being tested:					
RAT	5	5 days incl. weekend	Y	Y	1-3, 5
SAT	5	5 days incl. weekend	Y	Y	1-3, 5
CC LAT (optional)	5	5 days incl. weekend	Y	Y	1-3, 5
HC LAT (optional)	5	5 days incl. weekend	Y	Y	1-3, 5
MAT	5	5 days incl. weekend	Y	Y	1, 3
Indoor WB or enthalpy, if enthalpy economizer	5	5 days incl. weekend	Y	Y	1, 3
SF speed, if variable, else status	5	5 days incl. weekend	Y	Y	1, 5-9
RF speed, if variable, else status	5	5 days incl. weekend	Y	Y	1, 5-9
Duct SP	5	5 days incl. weekend	Y	Y	1, 7, 9
Building SP differential	5	5 days incl. weekend	Y	Y	8
OSAT	5	5 days incl. weekend	Y	Y	All
OSA-WB or enthalpy, if enthalpy economizer	5	5 days incl. weekend	Y	Y	1, 3
Indoor dry-bulb zones (expected to be most problematic)	5	5 days incl. weekend	Y	Y	All

Remarks:

CCV position (optional)
HCV position (optional)
SF cfm not required if not monitored
RF cfm not required if not monitored

G. Acceptance Criteria (referenced by function or mode ID)

1. 1-21. For the conditions, sequences and modes tested, the AHU/RTU, integral components and related equipment respond to varying loads and changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.
2. AHU/RTU with supporting systems shall be able to maintain the SA temperature within 1.0F either side of the deadband of the current setpoint without excessive hunting.
3. AHU/RTU and controls shall control the duct static pressure so that it does not drift more than an amount equal to 10% of the setpoint value either side of the deadband without excessive hunting.

H. Sampling Strategy for Identical Units

1. All identical AHU's/RTU's over 15 tons shall not have any sampling--test all units. However, 25% of the units may have monitoring be the verification method for modes listed with Monitoring or Both as testing methods, with no less than three units being fully tested per the above requirements.
2. All identical AHU's/RTU's equal to or less than 15 tons shall be sampled: Randomly test at least 50% of each group of identical equipment (the 1st sample) per the above tests. In no case test less than three units in each group. If 20% of the units in the first sample fail the functional performance tests, test another the remaining 50%, fully at the contractor's expense. This sampling applies to the testing subsections. That is, if calibration is off on more than 10% of the tested piece of equipment, then another sample shall have calibrations checked, but not all other tests need to be done on the second sample.
3. All units not included in the sampling testing and monitoring shall be fully monitored for the monitoring modes listed above in the monitoring section.

3.02 BOILER SYSTEM (HEATING WATER)

A. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls, as needed.
2. HVAC mechanical contractor or vendor: assist in testing sequences.

3. CA: to witness, direct and document testing.

B. Integral Components or Related Equipment Being Tested

Construction Checklist ID

- | | |
|--------------------------------|----------|
| 1. Boiler | PC-_____ |
| 2. Primary HW supply pumps | PC-_____ |
| 3. Heating water piping system | PC-_____ |
| 4. Secondary HW supply pumps | PC-_____ |
| 5. VFD on secondary pumps | PC-_____ |

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

<u>Function / Mode</u>	<u>Test Method</u> Manual, Monitoring, Either or Both	<u>Required Seasonal Test¹</u>
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, shutdown, unoccupied & manual modes and power failure. Test functionality of this piece of equipment or system in all control strategies or interlocks that it is associated with.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. <u>Primary Side.</u> Lead/lag staging of boilers, optimization, capacity modulation, and primary HW supply pumps.	Both	Heating
3. <u>Secondary Side.</u> Secondary WH supply pump staging, bypass valve operation, if no VFD and HWT reset. VFD operation: modulation to minimum, control system PID, proportional band of speed vs controlling parameter, verification of program settings,, alarms, etc.	Both	Heating
4. Check all alarms and safeties (high and low pressure and temperature, etc.), PRV and flow switch functions	Manual	
5. Test each possible lead boiler as lead boiler, and each pump as lead pump. Test pump lockouts.	Manual	
6. Flue gas analysis verification, optional	Manual	
7. Efficiency and capacity tests, optional	Manual	Heating

<u>Function / Mode</u>	<u>Test Method</u> Manual, Monitoring, Either or Both	<u>Required Seasonal Test</u> ¹
8. Verify boiler inlet/outlet pressures with startup report and manufacturer's recommendations	Manual	
9. Sensor and actuator calibration checks on: HWST, HWRT, pressure sensor controlling pump speed, mixing valve and other random checks (EMS readout against hand-held calibrated instrument must be within 0.5°F for temps. or within a tolerance equal to 10% of the pressure setpoint, with a test gage)	Manual	
10. Constancy of differential pressure (pump control parameter)	Monitoring	Heating
11. Verify schedules and setpoints to be reasonable and appropriate		

¹Cooling season, Heating season or Both. "Design" means within 5° of season design (ASHRAE 2 1/2%), or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.

E. Special Procedures (other equipment to test with, etc.; reference to function ID)

1. False load boiler, if necessary.

F. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using data loggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min.)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
For each boiler and pump:					
Boiler current or status	5	5 days incl. weekend	Y	Y	1-3
HWST	5	5 days incl. weekend	Y	Y	1, 3
HWRT	5	5 days incl. weekend	Y	Y	1, 3
OSAT-DB	5	5 days incl. weekend	Y	Y	1-3
HWS primary pump current or status	5	5 days incl. weekend	Y	Y	1, 2

Point	Time Step (min .)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
HWS secondary pump speed, if variable	5	5 days incl. weekend	Y	Y	1, 3
HWS secondary pump flow rate, if in EMS	5	5 days incl. weekend	Y	Y	1, 3
HWS secondary pump speed controlling parameter value	5	5 days incl. weekend	Y	Y	1, 3, 10

Remarks:

G. Acceptance Criteria (referenced by function or mode ID)

1. 1-11. For the conditions, sequences and modes tested, the boilers, integral components and related equipment respond to varying loads and changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.
2. Boiler shall maintain the supply water set point to within +/- 1.0F of set point dead band without excessive hunting.
3. 9.-10. Pumping system and controls shall maintain the current desired pressure set point to within an amount equal to 10% of the set point value either side of the dead band without excessive hunting.

H. Sampling Strategy for Identical Units

1. No sampling, test all.

3.03 BUILDING AUTOMATION SYSTEM (BAS)

A. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls to activate the equipment.
2. CA: to witness, direct and document testing.

B. Integral Components or Related Equipment Being Tested
Construction Checklist ID

1. Building Automation System PC-_____
2. All construction checklists of controlled equipment

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed

by the installer, before the beginning of functional testing.

- D. A significant part of the BAS functional testing requirements is the successful completion of the functional tests of equipment the BAS controls or interlocks with. Uncompleted equipment functional tests or outstanding deficiencies in those tests lend the required BAS functional testing incomplete.
- E. Integral or stand-alone controls are functionally tested with the equipment they are attached to, including any interlocks with other equipment or systems and thus are not covered under the BAS testing requirements, except for any integrated functions or interlocks listed below.
- F. In addition to the controlled equipment testing, the following tests are required for the BAS, where features have been specified. The following testing requirements are in addition to and do not replace any testing requirements elsewhere in the specifications.

<u>Function / Mode</u>	<u>Test Method</u> Manual (demonstration), Monitoring, Either or Both
MISC. FUNCTIONS	
1. All specified functions and features are set up, debugged and fully operable	Verbal discussion of features
2. Power failure and battery backup and power-up restart functions	Demonstration
3. Specified trending and graphing features demonstration	See equipment trends
4. Global commands features	Demonstration
5. Security and access codes	Demonstration
6. Occupant over-rides (manual, telephone, key, keypad, etc.)	Demonstration
7. O&M schedules and alarms	Demonstration
8. Scheduling features fully functional and setup, including holidays	Observation in terminal screens or printouts
9. Date and time setting in central computer and verify field panels read the same time	Demonstration
10. Included features not specified to be setup are installed (list)	Demonstration
11. Occupancy sensors and controls	Demonstration
12. Demonstrate functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad	Demonstration of 100% of panels and 10% of ports
13. All graphic screens and value readouts completed	Demonstration
14. Setpoint changing features and functions	Done during equipment testing
15. Communications to remote sites	Demonstration
16. Sensor calibrations	Sampled during equipment tests
17. "After hours" use tracking and billing	

<u>Function / Mode</u>	<u>Test Method</u> Manual (demonstration), Monitoring, Either or Both
18. Final as-builts or redlines (per spec) control drawings, final points list, program code, setpoints, schedules, warranties, etc. per specs, submitted for O&Ms.	Observation
19. Verify that points that are monitored only, having no control function, are checked for proper reporting to BAS.	Observation
INTEGRATED TESTS	
20. Fire alarm interlocks and response	Demonstration
21. Duty cycling (if specified)	Monitoring
22. Demand limiting (including over-ride of limiting)	Monitoring
23. Sequential staging ON of equipment	Either
24. Optimum start-stop functions	Monitoring
25. All control strategies and sequences not tested during controlled equipment testing	Either
26. Other integrated tests specified in the contract documents	
27. Security system interlocks	Demonstration
28. Fire protection and suppression systems	Demonstration

G. Special Procedures (other equipment to test with, etc.; reference to function ID) None

H. Additional Required Monitoring

- Besides the trending and monitoring required with the functional testing of equipment, all points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using data loggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min .)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
Misc. equipment current or status for duty cycling and demand limiting	5	5 days incl. weekend	Y	Y	21-22

Point	Time Step (min .)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
Equipment or building kW or current for demand limiting	5	5 days incl. weekend	Y	Y	21-22
Optimum start/stop equip.	5	5 days incl. weekend	Y	Y	24

Remarks:

- I. Acceptance Criteria (referenced by function or mode ID)
 - 1. All For the conditions, sequences and modes tested, the BAS, integral components and related equipment respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.
- J. Sampling Strategy for Identical Units
 - 1. Sample 10% of the field panels for procedure 9, and 10% of the local ports for procedure 12. If 10% fail, test another 10%. If 10% of those fail, test all remaining units at the contractor's expense.

3.04 EXHAUST FANS

- A. The testing requirements apply to the following fans (check all that apply): central restroom, mechanical room.
- B. Parties Responsible to Execute Functional Test
 - 1. Temperature Controls Contractor: operate the controls to activate the equipment, if BAS controlled.
 - 2. CA: to witness, direct and document testing.
- C. Integral Components or Related Equipment Being Tested

Construction Checklist ID

 - 1. Exhaust fans PC-_____
- D. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.
- E. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements
The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

<u>Function / Mode</u>	<u>Test Method</u> Manual, Monitoring, Either or Both ¹	<u>Required Seasonal Test</u>
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, shutdown, unoccupied & manual modes and power failure. Test functionality of this piece of equipment or system in all control strategies or interlocks that it is associated with.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Verify schedules and setpoints to be reasonable and appropriate		
3. Function at fire alarm (off, depressurization, etc.)	Manual	
4. Interlocks to building pressurization control	Manual	
5. Speed controls	Either	
6. Check TAB report record of sound power level tests and space pressures and compare to specifications	Review	
7. Sensor calibration checks on any controlling temperature or pressure sensor	Manual	

¹Refer to Special Procedures

F. Special Procedures (other equipment to test with, etc.; reference to function ID) None

G. Required Monitoring

- All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using dataloggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min .)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
For each fan:					
Do be determined					

Remarks:

- H. Acceptance Criteria (referenced by function or mode ID)
 - 1. 1-6. For the conditions, sequences and modes tested, the fans, integral components and related equipment respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.
- I. Sampling Strategy for Identical Units of the same type and function, but different in size, are considered identical for sampling purposes.
 - 1. Randomly test at least 10% of each group of identical equipment (the 1st sample). In no case test less than three units in each group. If 10% of the units in the first sample fail the functional performance tests, test another 10% of the group (the 2nd sample). If 10% of the units in the 2nd sample fail, test all remaining units in the whole group, fully at the contractor's expense. This sampling applies to the testing subsections. That is, if calibration is off on more than 10% of the tested piece of equipment, then another sample shall have calibrations checked, but not all other tests need to be done on the second sample.

3.05 INDOOR AIR CLIMATE CONTROL--MISC. SYSTEMS

- A. At least 10% of all space zones shall be verified to be maintaining proper climate control. Specific test requirements for this may have been identified elsewhere in this specification (e.g., under terminal units). For all areas not specifically specified, otherwise, the following tests shall be conducted.
- B. Parties Responsible to Execute Functional Test
 - 1. Temperature Controls Contractor: operate the controls and provide trend logs
 - 2. CA: to witness, direct and document testing.
- C. Integral Components or Related Equipment Being Tested
 - 1. Cooling plant (entire system)
 - 2. Heating plant (entire system)
 - 3. Air, water distribution system
 - 4. Control system
- D. Prerequisites All listed systems in Part B, above, shall have had successful functional tests completed prior to this test.
- E. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

This is a performance test to verify that the HVAC systems can provide and maintain the temperature and relative humidity levels specified, during normal and extreme weather and occupancy conditions. The test consists of monitoring, via trend logs, of various points during the cooling season when temperatures reach to within 5°F of season design (ASHRAE 2 1/2%).

F. Special Procedures (other equipment to test with, etc.; reference to function ID)

1. Building should be normally occupied during the test.

G. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min .)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
Space temperature control:					
Space temperature	5	5 days incl. weekend	Y	Y	1-3
OSAT-DB	5	5 days incl. weekend	Y	Y	1-3

Remarks:

H. Acceptance Criteria (referenced by function or mode ID)

1. Space temperature during occupied modes shall average within +/- 1°F of set point and always remain within 1°F of the ends of the dead band without excessive hunting of either the applicable damper or coil valve, or complaints of drafts or stuffiness from occupants.

I. Sampling Strategy for Identical Units of the same type and function, but different in size, are considered identical for sampling purposes.

1. Randomly test at least 10% of each group of identical equipment (the 1st sample). In no case test less than three units in each group. If 10% of the units in the first sample fail the functional performance tests, test another 10% of the group (the 2nd sample). If 10% of the units in the 2nd sample fail, test all remaining units in the whole group, fully at the contractor's expense. This sampling applies to the testing subsections. That is, if calibration is off on more than 10% of the tested piece of equipment, then another sample shall have calibrations checked, but not all other tests need to be done on the second sample.

3.06 SERVICE HOT WATER SYSTEM

A. Parties Responsible to Execute Functional Test

1. CA: perform and document testing.

B. Integral Components or Related Equipment Being Tested
Construction Checklist ID

1. Hot water heaters (heaters, mixing valves) PC-_____
2. Recirculating pumps PC-_____

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements
The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

<u>Function / Mode</u>	<u>Test Method</u> Manual, Monitoring, Either or Both	<u>Required Seasonal Test</u>
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, shutdown, unoccupied & manual modes and power failure. Test functionality of this piece of equipment or system in all control strategies or interlocks that it is associated with.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Verify schedules and setpoints to be reasonable and appropriate		
3. Unoccupied pump operation	Either	
4. Mixing valve operation and temperature control	Either	
5. Sensor calibration checks on hot water temperature	Manual	

E. Special Procedures (other equipment to test with, etc.; reference to function ID) None

F. Required Monitoring None

G. Acceptance Criteria (referenced by function or mode ID)

1. 1-6. For the conditions, sequences and modes tested, the fan's integral components and related equipment respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.

H. Sampling Strategy for Identical Units

1. No sampling. Test all units.

3.07 TERMINAL UNITS

(This applies to standard applications, critical applications will have additional tests and a higher fraction tested.)

A. Parties Responsible to Execute Functional Test

1. Temperature Controls Contractor: operate the controls to activate the equipment.

B. Integral Components or Related Equipment Being Tested

Construction Checklist ID

1. Terminal unit (TU) PC-_____

C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.

D. Functions / Modes Required To Be Tested, Test Methods and Seasonal Test Requirements

The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

<u>Function / Mode</u>	<u>Test Method</u> Manual, Monitoring , Either or Both ³	<u>Required Seasonal Test</u> ¹
General 1. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned; including startup, warmup, shutdown, unoccupied & manual modes and power failure and restoration. Test functionality of this piece of equipment or system in all control strategies or interlocks that it is associated with, including all damper, valve and fan functions.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Sensor activator calibration checks on: SAT, MAT, zone air temperature damper position and other random checks (EMS readout against visual or hand-held calibrated instrument must be within 0.5°F for temps. or within a tolerance equal to 10% of static pressure setpoint, with an inclined manometer)	Manual	
3. Device and actuator calibration and stroke checks for heating coil valve and non-DDC dampers	Manual	

<u>Function / Mode</u>	<u>Test Method</u> Manual, Monitoring , Either or Both ³	<u>Required Seasonal Test</u> ¹
4. For the TU's tested, check the construction checklist items.	Observation	
5. Verify control parameters and setpoints to be reasonable and appropriate by reviewing the full program of 5% of all the TU's with each other for consistency. Verify the max. and min. cfm setpoints of all tested TU's against the control drawing and TAB values. Verify other TU programming parameters such as K-factors, deadbands, setpoints, stroke times, etc.	Observation	
6. Verify no CCV flow when there is HCV flow	Either	
7. Verify no hunting or significant overshoot by damper or valves.	Either	
8. Verify by measurement, CCV & HCV positive shutoff (no leak-thru)	Manual	
9. Verification of minimum OSA control through varying VAV box positions, if applicable	Either	²
10 All alarms (fan status, low limits, high static, etc.)	Manual	
11 Verify that TU is maintaining space setpoint temperatures	Monitoring	Both Design
12 Verify airflows and pressures (this random test is part of the TAB test)	--	

NOTES:

¹Cooling season, Heating season or Both. "Design" means within 5°F of season design (ASHRAE 2 1/2%), or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.

²Seasonal test not required if seasonal conditions can be adequately simulated.

³Refer to Special Procedures

E. Special Procedures (other equipment to test with, etc.;; reference to function ID) None

F. Required Monitoring

1. All points listed below which are control system monitored points shall be trended by the Temperature Controls Contractor. Other points shall be monitored by the CA using dataloggers. Refer to the Monitoring section at the beginning of Section 15997 for additional monitoring details.

Point	Time Step (min .)	Minimum Time Period of Trend	Hard Copy? (Y/N)	ASCII File? (Y/N)	Function Being Tested
For each zone thermostat and space sensor and other critical areas, monitor:					
Space temperature	10	3 weekdays, summer design	Y	Y	11
Space temperature	10	3 weekdays, winter design	Y	Y	11
Space temperature	2	8 hours, occupied	Y	Y	7
Heating coil valve	2	8 hours, occupied	Y	Y	7
Damper position or cfm	2	8 hours, occupied	Y	Y	7

Remarks:

G. Acceptance Criteria (referenced by function or mode ID)

1. 1-11. For the conditions, sequences and modes tested, the TU, integral components and related equipment respond to varying loads and changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice.
2. 10. Space temperature during occupied modes shall average within +/- 1°F of setpoint and always remain within 1°F of the ends of the deadband without excessive hunting of either the damper or coil valve, or complaints of drafts or stuffiness from occupants.

H. Sampling Strategy for Identical Units of the same type and function, but different in size, are considered identical for sampling purposes.

1. Testing. Randomly test at least 10% of each group of identical equipment (the 1st sample). In no case test less than three units in each group. If 10% of the units in the first sample fail the functional performance tests, test another 10% of the group (the 2nd sample). If 10% of the units in the 2nd sample fail, test all remaining units in the whole group, fully at the contractor's expense. This sampling applies to the testing subsections. That is, if calibration is off on more than 10% of the tested piece of equipment, then another sample shall have calibrations checked, but not all other tests need to be done on the second sample.
2. Monitoring. Ten percent of the total number of zones in the building, chosen by the Owner, shall be monitored. Within this 10%, shall be included a distribution of all air handlers, zones expected to have the greatest heating and cooling demand, perimeter and core zones and zones identified from the commissioning process that have exhibited potential problems.

3.08 TEST AND BALANCE WORK (TAB)

- A. Parties Responsible to Execute Functional Test
 - 1. TAB contractor: perform checks using test instruments.
 - 2. Temperature Controls Contractor: operate the controls to activate the equipment.
 - 3. CA: to witness, direct and document testing.
- B. Integral Components or Related Equipment Being Tested
 - 1. TAB water-side Construction Checklist ID PC-_____
 - 2. TAB air-side PC-_____
- C. Prerequisites The applicable prerequisite checklist items listed in the beginning of Section 15997 shall be listed on each functional test form and checked off prior to functional testing. The commissioning agent will also spot-check misc. items and calibrations on the construction checklists previously completed by the installer, before the beginning of functional testing.
- D. Purpose. The purpose of this test is to spot check the TAB work to verify that it was done in accordance with the contract documents and acceptable practice and that the TAB report is accurate.
- E. The following tests and checks will be conducted. The following testing requirements are in addition to and do not replace any testing requirements elsewhere in this Division.

<u>Test or Check</u>	<u>Test Method</u>	<u>Required Seasonal Test³</u>
<p>A random sample of up to 25 % the TAB report data shall be selected for verification (air velocity, air or water flow rate, pressure differential, electrical or sound measurement, etc.). The original TAB contractor will execute the checks, witnessed by the commissioning authority. The TAB contractor will <u>use</u> the same test instruments as used in the original TAB work.</p> <p>A failure¹ of more than 10% of the selected items of a given system² shall result in the failure of acceptance of the system TAB report and the TAB contractor shall be responsible to rebalance the system, provide a new system TAB report and repeat random verifications of the new TAB report.</p> <p>The testing will include the verification of minimum outdoor air intake flows at minimum, maximum and intermediate total airflow rates for 100% of the air handlers. Other selected data to be verified will be made known upon day of testing.</p>	Demonstration	
<p>2. Verify that final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked by the TAB Contractor.</p>	Demonstration	
<p>3. Verification that the air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity. This shall include a review of TAB methods, control setpoints established by TAB and a physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all TUs taking off downstream of the static pressure sensor, the TU on the critical leg has its damper 90% or more open.</p>	Demonstration	
<p>4. Verification that the water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity. This shall include a review of TAB methods, control setpoints established by TAB and a physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90% or more open.</p>	Demonstration	

¹Failure of an item is defined as follows:

For air flow of supply and return: a deviation of more than 10% of instrument reading

For minimum outside air flow: 20% of instrument reading (30% for reading at intermediate supply flow for inlet vane or VFD OSA compensation system using linear proportional control)

For temperatures: a deviation of more than 1°F

For air and water pressures: a deviation of more than 10% of full scale of test instrument reading

For sound pressures: a deviation of more than 3 decibels. (Variations in background noise must be considered)

²Examples of a "system" are: the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system. Systems can be defined smaller if inaccuracies in TAB work within the smaller defined system will have little or no impact on connected systems.

³Cooling season, Heating season or Both. "Design" means within 5° of season design (ASHRAE 2 1/2%), or 95% of loading design. A blank cell denotes no special seasonal test is required and that test can be executed during any season, if condition simulation is appropriate.

F. Special Procedures (other equipment to test with, etc.; reference to function ID) None

G. Required Monitoring None

H. Acceptance Criteria (referenced by function or mode ID)

1. Provided in footnote to test table above.

I. Sampling Strategy for Identical Units

1. Described in test table above.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15011A - PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. This Section contains General Provisions related specifically to the Plumbing Work.
 - 1. Quality Assurance
 - 2. Protection
 - 3. Coordination and Sequencing
 - 4. General Completion
 - 5. Painting and Finishing
 - 6. Excavation for Plumbing Work
 - 7. Concrete for Plumbing Work
- B. Drawings and General Provisions of Contract, including General and Supplementary Conditions, apply to this section.

1.02 GENERAL

- A. This Contractor, as well as sub-contractors for his work, must carefully read the "Instructions to Bidders" and study the plans and specifications.
 - 1. It is the intention of these specifications to provide for the furnishing and installing of the plumbing equipment complete as shown and specified. Any work or changes which may be evidently necessary to complete the installation shall be furnished by the Contractor as being included in this Contract.
 - 2. During the course of the work, should any ambiguities or discrepancies be found in the specifications to which the Contractor has failed to call attention to before submission of his bid, then the Engineer shall interpret the intent of the specifications, and the Contractor hereby agrees to abide by the Engineer's interpretation and agrees to carry out the work in accordance with the decision of the Engineer. It is expressly stipulated that neither the instructions nor the specifications shall take precedence, one over the other, and it is further stipulated that the Engineer may interpret or construe the specifications of the work, and of that question the Engineer shall be the sole judge.
 - 3. Where no specified kind of quality of material is given, a first class standard article as approved by the Engineer shall be furnished. The specifications do not undertake to illustrate or set forth every item necessary for the work.

4. Small details not usually shown or specified but necessary for its proper installation and finishing shall be included in the Contractor's estimate, the same as if hereby specified or shown.

1.03 QUALITY ASSURANCE

A. Laws, Permits, Inspections.

1. Comply with the latest revisions of New York State Uniform Fire Protection and Construction Code, International Plumbing Code, any Local Codes or Regulations that apply.
2. Underwriters Laboratories label required for all electrical materials carrying 50 volts or more.
3. Comply with New York State Energy Conservation Construction Code, as referenced in NYCRR.
4. Comply with N.Y. State Education Department Manual of Planning Standards.
5. Comply to requirements of drawings and specifications that are in excess of governing codes.
6. Comply with section 1621 of the New York State Building Code for seismic requirements.
7. Do not install work as specified or shown if in conflict with governing code. Notify Engineer and request direction.
8. Pay all Inspection and Permit fees.
9. Provide Certificate of Inspection from all governing authorities.

B. Reference to technical society, organization, body or section made in accordance with the following abbreviations:

1. AGA - American Gas Association
2. AIA - American Institute of Architects
3. AMCA - American Moving and Conditioning Association, Inc.
4. ANSI - American National Standards Institute.
5. ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers
6. ASME - American Society of Mechanical Engineers
7. ASTM - American Society of Testing Materials
8. AWS - American Welding Society Code
9. AWWA - American Water Works Association
10. CS - Commercial Standard
11. FS - Federal Specification
12. IEEE - Institute of Electric and Electronics Engineers
13. NEC - National Electric Code
14. NEMA - National Electrical Manufacturer's Association
15. NFPA - National Fire Protection Association
16. NYBFU - New York Board of Fire Underwriters
17. NYCRR - Codes, Rule and Regulations of the State of New York.
18. NSF - National Sanitation Foundation
19. PDI - Plumbing and Drainage Institute.

- 20. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
 - 21. USASI - United States of America Standards
 - 22. UL - Underwriters' Laboratories, Inc.
- C. Contractor submission of equivalent or substitute items other than those specified is at Contractor convenience only. If a substitution or equivalent is accepted, the Contractor shall coordinate the installation of the substitute or equivalent and make all associated changes required. The Contractor also waives any claim for additional costs associated with the substitute / equivalent which becomes apparent before, during or after installation. The Contractor agrees to bear any and all additional costs to all other contractors or subcontractors which are caused by the incorporation of the substitution / equivalent.

1.04 PROTECTION

- A. Protect equipment from damage, including water, chemical, mechanical injury and theft.
- B. Replace damaged equipment or components.
- C. Close and waterproof between sleeves, openings, pipes and voids in walls, floors and foundations to prevent entrance of water or moisture.
- D. Holes made in firewalls, partitions, fire stops, shall be patched to maintain fire rating integrity.
- E. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris and moisture.
- F. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.
- G. Protect flanges, fittings, and piping specialties from moisture and dirt.
- H. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.05 COORDINATION AND SEQUENCING

- A. Coordinate plumbing equipment installation with other building components.
- B. Arrange for chases, slots and openings in building structure during progress of construction, to allow for plumbing installations.

- C. Coordinate the installation of required supporting devices set sleeves in poured-in-place concrete and other structural components, as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.
- E. Coordinate connection of plumbing systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors where mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Section 15052A "Access to Plumbing Work."
- G. Coordinate installation of identifying devices after completion of covering and painting, where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.
- H. Coordination with other trades: Right-of-Way as follows:
 - 1. Light Fixtures.
 - 2. Fire Suppression.
 - 3. Steam and condensate piping.
 - 4. Hot water supply and hot water return piping.
 - 5. Drain Pipes and Vents
 - 6. Ductwork
 - 7. HVAC Piping
 - 8. Domestic Water Piping
 - 9. Electrical Conduit

1.06 GENERAL COMPLETION

- A. Oiling Equipment.
 - 1. Lubricate equipment and motors in accordance with manufacturer's requirements. Provide lubrication chart in frame mount where directed by Owner.
- B. Instructions to Owner's Representative.
 - 1. Give notice to Engineer when all systems are installed and operating.
 - 2. Obtain name of Owner's Representative to receive instructions.
 - 3. Schedule instructions of Owner's Representative by manufacturer's representative and instruct Owner in system

installation and operation for all equipment installed under this contract.

- C. Provide Operation and Maintenance manuals in accordance with the Requirements of Division 1 "Contract Closeout" Section.

1.07 PAINTING AND FINISHING

- A. Refer to Division 9, Section "Painting" for field painting Requirements.
- B. Damage and Touch-up: Repair marred and damaged factory painted finishes with materials and procedures to match original factory finish.

1.08 CUTTING AND PATCHING - SEE SPECIFICATION SECTION 15060A

1.09 EXCAVATION FOR PLUMBING WORK

- A. Description of Work: Types of excavation for plumbing related work specified in this section include:
 - 1. Underground plumbing utilities and services.
 - 2. Underground tanks and equipment enclosures.
 - 3. Interior and Exterior water distribution systems to 5 feet outside of the building or where indicated on the plans.
 - 4. Interior and Exterior sanitary and storm drainage systems to 5 feet outside of the building or where indicated on the plans.
- B. Project Conditions.
 - 1. Locate and protect existing utilities and other underground work in manner which will ensure that no damage or service interruption will result from excavating and backfilling. Liabilities arising out of performance of work is responsibility of Contractor doing excavation.
 - 2. Protect persons from injury at excavations by barricades, warnings, and illumination.
 - 3. Provide temporary covering or enclosure and temporary heat as necessary to protect bottoms of excavations from freezing and frost action. Do not install plumbing work on frozen excavation bases or sub bases.

1.10 CONCRETE FOR PLUMBING WORK

- A. Types of concrete for plumbing related work specified in this section include:
 - 1. Lean concrete backfill to support plumbing work.

2. Encasement of mechanical work.
3. Plumbing equipment foundations and housekeeping pads.
4. Inertia bases for isolation of plumbing work.
5. Rough grouting in and around plumbing work.
6. Patching concrete cuts to accommodate plumbing work.
7. Thrust block.

1.11 REBATES

- A. The Division 15A Contractor shall assist the Owner in applying for any available rebates from manufacturer's, utility companies, etc. on equipment or materials installed under the contract. Provide all required documentation and assist in the completion of applications as required to complete the rebate process. All proceeds from rebates remain the property of the Owner.

PART 2 - PRODUCTS

2.01 BACKFILL MATERIALS

- A. Sub base Material (Bedding): Graded mixture of gravel, sand crushed stone or crushed slag.
- B. Backfill Material: Soil material free of large stones, shale, wood and similar material.

2.02 CONCRETE

- A. Concrete installed by this division shall comply with Division 3 Specifications for Concrete.

PART 3 - EXECUTION

3.01 EXCAVATION - GENERAL

- A. Do not excavate for plumbing work until work is ready to proceed without delay, so that total time lapse from excavation to completion of backfilling will be minimum.
- B. Excavate with vertical sided excavations to greatest extent possible, except where otherwise indicated. Where necessary, provide sheeting and cross bracing to sustain sides of excavation. Remove sheeting and cross bracing during backfilling wherever such removal would not endanger work or other property. Where not removed, cut sheeting off at sufficient distance below finished grade to not interfere with other work.
- C. Width: Excavate for piping with 6" to 9" clearance on both sides of pipe, except where otherwise shown or required for proper installation of pipe joints, fittings, valves and other work. Excavate for other mechanical work to provide minimum practical but adequate working clearance.

- C. Depth for direct support: For work to be supported directly on undisturbed soil, do not excavate beyond indicated depths, and hand excavate bottom cut to accurate elevations, undercut at pipe hubs.
- D. Depth for sub base support: For large piping (6" pipe size and larger), tanks, and where indicated for other plumbing work, excavate for installation of sub base material in depth indicated or, if not otherwise indicated, 6" below bottom of work to be supported.
- E. Depth for unsatisfactory soil or rock conditions: Where directed, (because of unsatisfactory conditions at bottom of indicated excavation), excavate additional depth as directed to reach satisfactory conditions. Backfill with sub base material compacted as directed, to indicate excavation depth.
- F. Store excavated material (temporarily) near excavation, in manner, which will not interfere with or damage excavation or other work. Do not store under trees (within drip line).
 - 1. Dispose of excavated material, which is either in excess of quantity needed for backfilling, or does not comply with requirements for backfill material.
 - a. Remove unused material from project site, and dispose of it in lawful manner.

3.02 WATER CONTROL

- A. Maintain dry excavations for plumbing work, by removing water. Protect excavations from inflow of surface water. Pump minor inflow of ground water from excavations, protect excavations from major inflow of ground water, by installing temporary sheeting and waterproofing. Provide adequate barriers which will protect other excavations and below grade property from being damage by water, sediment or erosion from or through plumbing work excavations.

3.03 BACKFILLING

- A. Do not backfill until installed plumbing work has been tested and accepted.
- B. Install drainage fill where indicated, and tamp to uniform firm density.
- C. Backfill with finely graded sub base material to 6" above wrapped, coated and plastic piping and tanks, or as shown on drawings and to centerline of other tanks.
- D. Condition backfill material by either drying or adding water uniformly, to whatever extent may be necessary to facilitate compaction to required densities. Do not backfill with frozen soil materials.

- E. Backfill simultaneously on opposite side of plumbing work, and compact simultaneously, do not dislocate work from installed positions.
- F. Backfill excavations in 8" high courses of backfill material uniformly compacted to the following densities (% of maximum density, ASTM D1557), using power-driven hand operated compaction equipment.
 - 1. Lawn and landscaped areas: 85% for cohesive soils, 90% for cohesion less soil.
 - 2. Paved areas and roadways: 90% for cohesive soils, 95% for cohesion less soils.
- G. Backfill to elevations matching adjacent grades, at time of backfilling excavations for mechanical work. Return surfaces to original condition.
- H. After covering piping with 6" layer of approved fill backfill and compact excavations beneath:
 - 1. New foundations.
 - 2. Slabs on grade.
 - 3. Areas to be paved by General Contractor.

3.04 CONCRETE BASES

- A. Construct concrete equipment bases of minimum 4 inches higher or as shown on drawings, and not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations.

3.05 CONCRETE GENERAL

- A. Concrete installed by this division shall comply with Division 3 Specifications for Concrete.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15013A - CODES, STANDARDS, AND PERMITS

1.01 GENERAL

- A. The entire installation shall be made in accordance with State rules and regulations and shall also conform with the standards of the National Board of Fire Underwriters for this installation and the local Board of Fire Underwriters having jurisdiction. The installation shall also comply with air pollution requirements of the State of New York and Industrial Code Rule 4 of the State of New York Department of Labor, Board of Standards and Appeals, dated March 31, 1965, and all other ordinances having jurisdiction.
- B. The Contractor shall submit to all authorities having jurisdiction all required applications and shall secure all necessary permits, tests, and inspections required for final approval.
- C. Certain standard and staple materials are described by reference to standard specifications. These standards are as follows:
- | | |
|--------|---|
| AGA | American Gas Association |
| ASA-B9 | Safety Code for Mechanical Refrigeration |
| ASHRAE | American Society of Heating, Refrigerating,
and Air Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society of Testing Materials |
| CGA | Compressed Gas Association |
| AWWA | American Water Works Association |
| CS | Commercial Standard |
| FS | Federal Specification |
| NEMA | National Electrical Manufacturer's
Association |
| NFPA | National Fire Protection Association |
| NSF | National Sanitation Foundation |
| PDI | Plumbing and Drainage Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractors
National Association |
| USASI | United States of America Standards Institute |
| UL | Underwriters' Laboratories |
| | New York State Uniformed Fire Prevention and
Building Code |
| IPC | International Plumbing Code |
- D. All electric facilities shall receive the Underwriters label and be installed in accordance with the latest issue of the National Electric Code requirements.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15014A - SCHEDULE OF EQUIVALENCY

1.01 GENERAL

- A. Wherever a brand name or manufacturer is named in this specification, it indicates the standard of quality or purpose desired. Where one certain kind, type, brand, or manufacturer of materials is named, it shall be regarded as the standard quality. Where two or more are named, these are presumed to be equal, and the Contractor may select one of those items; if the Contractor desires to use any other kind, type, brand, or manufacturer of material other than named in the specifications, he shall submit a list, with his bid, stating what material, equipment, or method is offered as equal and how it affects the contract price.
- B. The equivalency of such items is to be judged by the Engineer whenever offered by bidders as equivalent to the Base Bid items and so reported to the Owner for his ultimate decision.
- C. The following manufacturers are approved equivalents for those listed in the specifications:
1. Insulation:

Johns-Mansville Corporation
Owens-Corning Fiberglass Corporation
Knauf
Certainteed
 2. Drains, Cleanouts, Flashing Sleeves, Wall Hydrants, Water Hammer Arrestors, Interceptors, and Fixture Supports

Zurn Manufacturing Company
Josam Manufacturing Company
Jay R. Smith Company
 3. Plumbing Fixtures

Zurn
American Standard
Crane Company
 4. Fixture Trim

American Standard
Chicago Faucet Company
T & S Brass and Bronze Works
 5. Flush Valves

Zurn
Sloan Valve Company
American Standard

6. Toilet Seats

American Standard
Olsonite
C.F. Church Company

7. Access Doors

Karp Associates, Inc.
Zurn Manufacturing Company
Wilcox Steel Company

8. Valves

Jenkins Brothers
Lukenheimer Company
Walworth Company

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15015A - MAINTENANCE INSTRUCTIONS

PART 1 - GENERAL

1.01 GENERAL

- A. In addition to the requirements outlined in the "General Provisions", the following information shall be incorporated:
1. Manufacturer's plumbing equipment parts list of all functional components including control diagrams and wiring diagrams of controllers.
 2. Step by step instructions for each system including preparation for starting, operation, and shutdown. Provide full maintenance manual describing procedures for each new piece of equipment. In addition, provide a video showing / describing step by step instructions for maintenance of each new piece of equipment.
 3. Twelve-month maintenance schedule for each type of equipment.
 4. Possible breakdowns and repairs for each type of equipment.
 5. List of nearest local suppliers for all equipment.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15050A - PLUMBING BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. This Section includes the following basic plumbing materials and methods to complement other Division 15A Sections.
 - 1. Submittals.
 - 2. Pipe joining materials and installation instructions common to piping systems.
 - 3. Piping specialties: Escutcheons, dielectric fittings, sleeves and seals.
 - 4. Non-shrink grout for equipment installations.
 - 5. Drip pans.
 - 6. Pipe supports: Hangers, clamps, support spacing, building attachments, shields and saddles, flashing, miscellaneous materials, and anchors.
 - 7. Field fabricated metal and wood equipment supports.
 - 8. Firestopping.
- B. Pipe and pipe fitting materials are specified in piping system sections.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. NSF 372 and ANSI 61

1.03 SUBMITTALS

- A. General - Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for following piping specialties:
 - 1. Mechanical sleeve seals.
 - 2. Identification materials and devices.
- C. Reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

1.04 STANDARDS FOR MATERIALS AND WORKMANSHIP

- A. All materials and workmanship shall, at a minimum be in accordance with (in no order of precedence):
 - 1. New York State Codes - latest edition as adopted by the Authority Having Jurisdiction, unless otherwise noted.

2. State and municipal Building Codes and related subcodes.
3. Occupational and Safety Act (OSHA) Requirements.
4. Rules and Regulations of the Authority Having Jurisdiction applicable to the work.
5. National Electrical Standards Association Standard for Good Workmanship in Electrical Construction (NECA-1)
6. Serving utility's rules and regulations for providing service.
7. Contract Drawings and Specifications.
8. Manufacturer recommended installation instructions, practices and procedures for the products being utilized or installed.
9. Where conflicts arise between the above, the more stringent requirement shall be adhered to.

PART 2 - PRODUCTS

2.01 PIPE AND PIPE FITTINGS

- A. Refer to individual piping system specification Sections for pipe and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- C. All fittings NSF 372 ANSI 61.

2.02 PIPE JOINING MATERIALS

- A. Refer to individual piping system specification Sections in Division 15A for special joining materials not listed below.
- B. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.
 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, except where thickness or specific material is indicated.
 - a. Full-Face Type: for flat-face, Class 125 cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: for raised-face, Class 250 cast-iron and steel flanges.
 2. AWWA C110, rubber, flat face, 1/8-inch-thick, except where other thickness is indicated; and full-face or ring type, except where type is indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where

other material is indicated.

2.03 PIPING SPECIALTIES

- A. Escutcheons: Manufactured wall, ceiling and floor plates; deep-pattern type, where required to conceal protruding fittings and sleeves.
 - 1. Inside Diameter: Closely fit around pipe, tube and insulation of insulated piping.
 - 2. Outside Diameter: Completely cover opening.
 - 3. Cast Brass: One-piece, with set-screw.
 - a. Finish: Rough brass.
 - b. Finish: Polished chrome plate.
 - 4. Cast Brass: Split casting, with concealed hinge and set-screw.
 - a. Finish: Rough brass.
 - b. Finish: Polished chrome plate.
 - 5. Stamped Steel: One-piece, with set screw and chrome plated finish.
 - 6. Stamped Steel: One-piece with spring clips and chrome plated finish.
 - 7. Stamped Steel: Split plate with concealed hinge, set-screw, and chrome plated finish.
 - 8. Stamped Steel: Split plate with concealed hinge, spring clips and chrome plated finish.
 - 9. Cast-Iron Floor Plate: One-piece casting.
- B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.
 - 1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.
 - 2. Insulating Material: Suitable for system fluid, pressure and temperature.
 - 3. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F temperature.
 - 4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum pressure to suit system pressures.
 - 5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers and steel backing washers.
 - a. Provide separate companion flanges and steel bolts and nuts for 150 or 300 psig minimum working pressure to suit system pressures.

6. Dielectric Couplings: Galvanized steel coupling, having inert and non-corrosive, thermoplastic lining, with threaded ends and 300 psig minimum working pressure at 225 deg F temperature.
 7. Dielectric Nipples: Electroplated steel nipple, having inert and non-corrosive, thermoplastic lining, with combination of plain, threaded or grooved end types and 300 psig working pressure at 225 deg F temperature.
- C. Mechanical Sleeve Seals: Modular, watertight, mechanical type. Components include interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve. Connecting bolts and pressure plates cause rubber sealing elements to expand when tightened.
- D. Sleeves: The following materials are for wall, floor, slab and roof penetrations.
1. Steel Sheet-Metal: 24 gage or heavier, galvanized sheet metal, round tube closed with welded longitudinal joint.
 2. Steel Pipe: ASTM A53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 3. Cast-Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, having plain ends and integral water stop, except where other features are specified.
 4. Wall Penetration Systems: Wall sleeve assembly, consisting of housing, gaskets and pipe sleeve, with 1 mechanical-joint end conforming to AWWA C110 and 1 plain pipe-sleeve end.
 - a. Penetrating Pipe Deflection: 5 percent without leakage.
 - b. Housing: Ductile-iron casting having waterstop and anchor ring, with ductile-iron gland, steel studs and nuts, and rubber gasket conforming to AWWA C111 of housing and gasket size as required to fit penetrating pipe.
 - c. Pipe Sleeve: AWWA C151, ductile-iron pipe.
 - d. Housing-to-Sleeve Gasket: Rubber or neoprene, push-on type, of manufacturer's design.
 5. Cast-Iron Sleeve Fittings: Commercially-made, sleeve having integral clamping flange, with clamping ring, bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.

2.04 VALVES

- A. Refer to individual piping system specifications section in Division 15A for special valves not listed below.
- B. General

1. Valves shall be installed only in upright vertical or horizontal positions unless specifically otherwise required by the drawings.
2. All valves shall be installed in accessible locations to facilitate easy removal for repair or replacement. Where not possible provide access doors. Refer to 15052A.
3. All gate and globe valves shall be designed for repacking when wide open under pressure.
4. Domestic water system valves 3/4" and smaller and all balancing valves shall be globe type.
5. All valves of the same type shall be the products of a single manufacturer and shall comply with ANSI B31.1.
6. All valves for domestic water use shall be no lead type in accordance with NSF-372 ANSI 61.

C. GATE VALVES

1. Cold, hot, and hot water return, 2" and smaller: Ball type solder end connections. Jenkins, Nibco, or equal Type B. 3" and larger gate valve: Jenkins, Nibco, or equal Type 1, Class "A", Style 3.

D. GLOBE VALVES

1. 3" or smaller: Jenkins, Nibco, or equal. Over 3": Jenkins, Nibco, or equal, Type 1 with cast iron body and bronze trim.

E. CHECK VALVES

1. 3" and smaller: Jenkins, Nibco, or equal, Type IV, Class "A".

2.05 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000 psi, 28-day compressive strength.
3. Packaging: Premixed and factory-packaged.

2.06 DRIP PANS

- A. Provide drip pans fabricated from corrosion resistant sheet metal with watertight joints, and with edges turned up 2-1/2 inches. Reinforce top, either by structural angles or by folding over according to size. Provide hole, gasket, and flange at low point for watertight joint and 1-inch drain line connection.

2.07 HORIZONTAL PIPING HANGERS AND SUPPORTS

- A. General: Except as otherwise indicated, provide factory fabricated horizontal piping hangers and supports. Hangers and supports shall be in complete conformance with Chapter 3 of the New York State Plumbing Code. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper plated hangers and supports for copper piping systems.
- B. Adjustable steel clevises.
1. Material: Carbon steel, copper plated for copper piping.
 2. Finish: Black or copper plated.
 3. Adjustment: Hanger to be adjustable for vertical height of pipe without removing the pipe.

2.08 VERTICAL PIPING CLAMPS

- A. Two bolt riser clamp.
1. Material: Carbon steel copper plated for copper piping.
 2. Finish: Black or copper plated.

2.09 HANGER ROD AND SPACING

ROD SIZE AND SPACING SCHEDULE

<u>Pipe Size</u>	<u>Maximum Spacing</u>		<u>Rod Size</u>
	Steel	Copper	
1/2 to 1	6 ft.	6 ft.	3/8"
1-1/4 to 1-1/2	6 ft.	6 ft.	3/8"
2	12 ft.	10 ft.	3/8"
2-1/2 - 3-1/2	12 ft.	10 ft.	1/2"
4 - 5	12 ft.	10 ft.	5/8"
6	12 ft.	10 ft.	3/4"
8 - 12	12 ft.		7/8"
14 - 16	12 ft.		1"

Note: Cast Iron - support at every hub or coupling 5 ft. maximum spacing.

2.10 BUILDING ATTACHMENTS

- A. General: Except as otherwise indicated provide factory fabricated building attachments of one of the following types listed, selected by Installer to suit building substrate conditions. Select size of building attachments to suit hanger rods. Provide copper plated building attachments for copper piping systems.
- B. On Structural Steel:

1. For pipes 2" and smaller: C clamps with lock nuts similar to Anvil figure 86.
 2. For pipes 5" and larger: Use beam clamps similar to Anvil figure 228 or 292.
- C. On New Masonry:
1. Use concrete inserts similar to Anvil figure 281.
- D. On Existing Concrete:
1. Use expansion case similar to Anvil figure 117.
- E. On Wood:
1. Use coach screw rods Anvil figure 142. Ceiling flanges Anvil figure 153, or fabricated angle clips. Use wood drive screws or lag bolts as fasteners.

2.11 SHIELDS AND SADDLES

- A. General: For insulated piping.
- B. Shields: 16-gauge galvanized metal.
- C. Protection saddles:
1. Hardwood block
 2. Steel saddle Anvil 160 series

2.12 FLASHING MATERIALS

- A. General: Provide flashings for each penetration of plumbing systems through roofs or waterproof membranes.
- B. Molded Pipe Flashing: Compatible with single ply membranes with which it is used and manufactured by membrane manufacturer.
- C. Coated copper flashing: Provide cold-rolled sheet copper (ANSI/ASTM B 370), of proper temper for applications shown and required forming, coated on one side with not less than 0.06 lbs. per sq. ft. of antimony (ANSI/ASTM B 101, Type I, Class A), weighing 1.06 lbs. per sq. ft., except as otherwise indicated.
- D. Bituminous coating: FS TT-C-494, or MIL-C-18480, or SSPC-Paint 12, cold applied solvent type bituminous mastic coating for application in dry film thickness of 15 mils per coat.

2.13 MISCELLANEOUS MATERIALS

- A. Metal framing: Provide products complying with NEMA.
- B. Steel plates, shapes and bars: Provide products complying with ANSI/ASTM A 36.

- C. Heavy duty steel trapezes: Fabricate from steel shapes selected for loads required, weld steel in accordance with American Welding Society (AWS) standards.
- D. Pipe guides: Provide factory fabricated guides, of cast semi-steel or heavy fabricated steel, consisting of a bolted two section outer cylinder and base with a two section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

2.14 ANCHORS

- A. Fabricate pipe anchors from 3 x 3 x 1/2" angle.
- B. Use pipe protection saddles one size larger than piping.

PART 3 - EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, except where system Sections specify otherwise. Individual piping system specification Sections in Division 15A specify piping installation requirements unique to the piping system.
- B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordinate drawings.
- C. Pitch piping at low points. Provide Manual Blowdown for maintenance.
- D. Install piping at indicated slope.
- E. Install components having pressure rating equal to or greater than system operating pressure.
- F. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- G. Install piping free of sags and bends.
- H. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.
- I. Install piping tight to slabs, beams, joists, columns, walls and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

- J. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- K. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- L. Install fittings for changes in direction and branch connections.
- M. Install couplings according to manufacturer's printed instructions.
- N. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wallboard partitions and suspended ceilings according to the following:
 - 1. Chrome-Plated Piping: Cast-brass, one-piece, with set-screw and polished chrome-plated finish. Use split-casting escutcheons where required, for existing piping.
 - 2. Uninsulated Piping Wall Escutcheons: Cast-brass or stamped-steel, with set-screw.
 - 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 - 4. Insulated Piping: Cast-brass or stamped-steel, with concealed hinge, spring clips and chrome-plated finish.
 - 5. Piping in Utility Areas: Cast-brass or stamped-steel with set-screw or spring clips.
- O. Sleeves are not required for core drilled holes.
- P. Permanent sleeves are not required for holes formed by PE plastic (removable) sleeves.
- Q. Install sleeves for pipes passing through concrete and masonry walls, concrete floor and roof slabs, and where indicated.
- R. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, concrete floor and roof slabs and where indicated.
 - 1. 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. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring where specified.
 - 2. Build sleeves into new walls and slabs as work progresses.
 - 3. Install large enough sleeves to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. CPVC Pipe Sleeves: For pipes smaller than 6 inches.
 - b. Steel Pipe Sleeves: For pipes smaller than 6 inches.
 - c. Steel Sheet-Metal Sleeves: For pipes 6 inches and

- larger, penetrating gypsum-board partitions.
- d. Cast-Iron Sleeve Fittings: For floors having membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
- e. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
- 4. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
- S. Above Grade, Exterior Wall, Pipe Penetrations: Seal penetrations using sleeve and mechanical sleeve seals. Size sleeve for 1 inch annular clear space between pipe and sleeve for installation of mechanical seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger.
 - 3. Assemble and install mechanical seals according to manufacturer's printed instructions.
- T. Below Grade, Exterior Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installation of mechanical seals.
- U. Below Grade, Exterior Wall, Pipe Penetrations: Install ductile-iron wall penetration system sleeves according to manufacturer's printed installation instructions.
- V. Verify final equipment locations for roughing-in.
- W. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- X. Piping Joint Construction: Joint pipe and fittings as follows and as specifically required in individual piping system specification Sections.
 - 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - 3. Soldered Joints: Construct joints according to AWS "Soldering Manual", "The Soldering of Pipe and Tube".
 - 4. Brazed Joints: Construct joints according to AWS "Brazing Manual", "Pipe and Tube".
 - 5. 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 inside diameter. Join pipe fittings and valves as follows:

- a. Note the internal length of threads in fittings or valve ends and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- Y. Welded Joints: Construct joints according to AWS "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe" using qualified processes and welding operators according to "Quality Assurance" article.
- Z. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
- AA. Piping Connections: Except as otherwise indicated, make piping connections as specified below.
- 1. Install unions, in piping 2 inches and smaller, adjacent to each valve and at final connection to each piece of equipment having 2 inches or smaller threaded pipe connection.
 - 2. Install flanges, in piping 2 1/2 inches and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
 - 3. Dry Piping Systems (Gas, Compressed Air, and Vacuum): Install dielectric unions and flanges to connect piping materials or dissimilar metals.
 - 4. Wet Piping Systems (Water): Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.02 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to provide the maximum possible headroom, where mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to the Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.

- D. Install mechanical equipment to facilitate servicing, maintenance and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
- E. Install equipment giving right-of-way to piping systems installed at a required slope.

3.03 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1 "Structural Welding Code - Steel".

3.04 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.05 GROUTING

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms for placement of grout, as required.
- D. Avoid air entrapment when placing grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases to provide a smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout according to manufacturer's printed instructions

3.06 DRIP PANS

- A. Locate drip pans under piping passing over or within 3 feet

horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, and weld rods to sides of drip pan. Brace to prevent sagging or swaying.

Connect 1-inch drain line to drain connection and run to nearest plumbing drain or elsewhere as indicated. Provide Leak Detection Alarm Floodmaster RS097. Provide power to unit.

3.07 INSTALLATION OF BUILDING ATTACHMENTS

- A. Install building attachments at required locations in concrete, in wood or on structural steel for proper piping support. Space attachments within maximum piping span length indicated. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed, fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.08 INSTALLATION OF HANGERS AND SUPPORTS

- A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Install hangers and supports of same type and style for grouped piping runs.
- C. Support fire water piping independently of other piping.
- D. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.
- E. Provisions for movement:
 - 1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
 - 2. Load distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
 - 3. Pipe slopes: Install hangers and supports to provide indicated pipe slopes.

- F. Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.

3.09 SHIELDS AND SADDLES FOR INSULATED PIPING

- A. 4" and below use 16 gauge x 12 inch long shield with oversized hanger outside insulation.
- B. 6" and above use hardwood protection saddle with 16 gauge x 18 inch long shield with oversized hanger outside insulation.
- C. 6" and above use steel protection saddle. Fill void between shield and pipe with insulation. Cover with vapor barrier. Protect barrier with 16 gauge x 18 inch long shield with oversized hanger outside assembly.

3.10 INSTALLATION OF ANCHORS

- A. Install anchors at proper locations to prevent stresses and to prevent transfer of loading and stresses to connected equipment.
- B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure.
- C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximums recommended by manufacturer for each unit.
- D. Anchor spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.11 FLASHINGS

- A. Manufacturer's recommendations: Except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of sheet metal being installed.
- B. Coat back side of metal flashings where in contact with concrete and other cementitious substrates, by painting surface in area of contact with heavy application of bituminous coating, or by other permanent separation as recommended by manufacturer of metal.
- C. On vertical surfaces, lap flashings minimum of 3".
- D. On sloping surfaces, for slopes of not less than 6" in 12", lap unsealed flashings minimum of 6".
- E. For embedment of metal flashing flanges in roofing or composition flashing or stripping, extend flanges minimum of 6" for embedment.

3.12 FIRE STOPPING

- A. Provide UL listed and tested firestopping material, silicone elastomer specifically formulated for use in horizontal and vertical applications. The material shall possess intumescent characteristics, and upon exposure to heat above 250 degrees F. shall expand to not less than five times its original volume to form a fireproof envelope UL rated for 2- and 3-hours protection, when applied in accordance with the manufacturer's recommendation.
- B. See section 15511 for additional fire stopping requirements.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15052A - ACCESS TO PLUMBING WORK

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Access doors in walls and ceilings.

1.02 SUBMITTALS

- A. Product data: Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices.

1.03 QUALITY ASSURANCE

- A. Fire resistance ratings: Where fire resistance rating is required for construction penetrated by access units, provide UL listed and labeled units, except for units which are smaller than minimum requirements.

PART 2 - PRODUCTS

2.01 ACCESS DOORS

- A. Where walls and ceilings must be penetrated for access to mechanical work, provide types of access doors indicated. Furnish sizes indicated or, where not otherwise indicated, furnish adequate size for intended and necessary access. Furnish manufacturer's complete units, of type recommended for application in indicated substrate construction, in each case, complete with anchorages and hardware.
- B. Construction: Except as otherwise indicated, fabricate wall/ceiling door units of welded steel construction with welds ground smooth, 16-gauge frames and 14-gauge flush panel doors, 175 degree swing with concealed spring hinges, flush screwdriver-operated cam locks, factory applied rust-inhibitive prime coat paint finish.
- C. Available manufacturers
 - 1. Milcor Div., Inryco Inc.
 - 2. Smith (Jay R.) Mfg. Co.
 - 3. Zurn Industries, Inc.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with manufacturer's instructions for installation of access doors.

- B. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- C. Adjust hardware and panels after installation for proper operation.
- D. Remove or replace panels or frames which are warped, bowed, or otherwise damaged.
- E. Paint access doors to match surrounding surfaces.
- F. In wet and damp locations provide stainless steel doors.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15057A - PLUMBING IDENTIFICATION SYSTEMS

1.01 GENERAL

- A. Provide labels for all new pipes including hot water, hot water return, cold water, sanitary drain, storm drain, vent, gas and acid waste piping. Install identifying tags on all valves.

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELS

- A. Small: Labels shall be adhesive backed plastic tape with embossed letters in contrasting color. Tape shall be 3/8" wide.
- B. Large: Labels shall be adhesive backed plastic tape with embossed letters in contrasting color.
- C. Make: Seton Name Plate Corporation.

2.02 PIPING MARKERS

- A. Pipe markers shall be snap-on type indicating pipe contents and direction of flow on a color coded background conforming to American National Standards Institute (ANSI) Standard A13.1. Pipe diameter less than 2" and smaller shall be snap-on type. Pipe diameter greater than 2" shall be stick-on type.
 - 1. Hot water - green with white lettering.
 - 2. Cold water - green with white lettering.
 - 3. Sanitary Drain and Vent - green with white lettering.
 - 4. Storm Drain - green with white lettering.
 - 5. Gas - yellow with black lettering.
 - 6. Acid Waste - black with orange lettering.
- B. Make: Seton Name Plate Corporation - Setmark, or equal by Dover, Brady.

2.03 VALVE TAGS

- A. Tags: Tags shall be 1 3/4" x 3 1/2" laminated with two 0.020" thick plastic sheets with matte finish and with a brass eyelet in the corner. Typed information shall include appropriate alphanumeric code (prefixed with the letter "P"), system designation, the fluid in the pipe, and size and function of the valve.
- B. Make: Dover Enterprises, Syracuse, New York or approved equal by Seton Name Plate Company.

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish; including valve tags in finished mechanical spaces, install identification after completion of covering and painting.

3.02 EQUIPMENT

- A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:
 - 1. Meters, gauges, thermometers and similar units.
 - 2. Fuel-burning units including water heaters.
 - 3. Pumps and similar motor-driven units.
 - 4. Storage tanks and pressure vessels.
 - 5. Strainers, filters, humidifiers, water treatment systems and similar equipment.
- B. Lettering Size: Minimum 1/4" high lettering for name of unit where viewing distance is less than 2'-0", 1/2" high for distances up to 6'-0", and proportionately larger lettering for greater distances. Provide secondary lettering 2/3 to 3/4 size of principal lettering.
- C. Text of Signs: In addition to name of identified unit, provide lettering to distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

3.03 PIPING

- A. After piping has been painted or insulated, apply pipe labels as specified above.
- B. Space labels on 15' centers in mechanical rooms, space at 25' centers elsewhere and at each side of partitions and interior walls. Also, at each branch and riser take off and adjacent to each valve (except at fixtures and equipment).

3.04 VALVES IDENTIFICATION

- A. General: Provide valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience hose bibs, and shut-off valves at plumbing fixtures, and similar rough-in connections of end-use fixtures and units. List each tagged valve in valve schedule for each piping system.
- B. Provide valve tag chart, framed and securely fastened to the wall, using anchors and fasteners, where directed by owner.
- C. Submit list of valve tags, including wording, for approval **BEFORE** ordering.

3.05 ADDITIONAL INFORMATION

- A. For additional information see Specification Section 15050A - Plumbing Basic Materials & Methods.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15060A - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 GENERAL

- A. Each Contractor shall be responsible for his cutting and patching. The Contractor shall also be responsible for all finish patching and painting.
- B. Each Contractor shall replace and patch any surfaces of any structure disturbed by his operations and his work, even if such operations and work are outside the contract limit. Such replacement, repair, and patching shall be with similar material and shall restore surfaces as they exist, or better.
- C. Cut and alter existing materials as required to perform the work. Limit cutting to the smallest amount necessary for proper installation of the work.
- D. Where the removal of existing building components necessitates the addition of patching in new materials, such work shall be executed to insure the fire resistance rating of the system and visual continuity with adjacent surfaces, whether or not the remedial work is specifically detailed on the drawings.
- E. Perform the removal work with such care as may be required to prevent damage to adjoining construction which is to remain.
- F. Do not disturb any existing structure, piping, apparatus, or other construction which must remain unless expressly required by the contract. Where cutting or removals are required in existing construction, do the work in a manner that will safeguard and not endanger the structure and as approved by the Engineer.
- G. If unforeseen obstructions are encountered, take all precautions necessary to prevent damage and obtain full instructions from the Engineer before proceeding with the work.
- H. Remove from the site all debris and other materials resulting from the alterations and removals, subject to the General Requirements.
- I. Fill all voids and patch existing construction and finishes damaged within area of alteration work unless otherwise indicated. Provide new materials to match existing corresponding items as closely as practicable.
- J. Any pipe penetrations through fire rated areas shall be accomplished using Hilti fire barrier products in sheets, strips, or caulk using ASTM, UL, and FM standards.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15180A - PLUMBING INSULATION

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Extent of plumbing insulation work required by this section is indicated on Drawings and by requirements of this section.
- B. Work includes thermal insulation for the following:
 - 1. Domestic cold water piping.
 - 2. Domestic hot water and hot water circulating piping.
 - 3. Domestic tempered water piping
 - 4. Storm water drainage piping.
 - 5. Roof drain bodies.

1.02 QUALITY ASSURANCE

- A. Fire Hazard Classification: In accordance with ASTM E-84, NFPA 255 and UL 723, for insulation systems, including insulation, adhesives and coverings, not to exceed the following:
 - 1. Flame spread 25.
 - 2. Fuel contributed 50.
 - 3. Smoke developed 50.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturers specification sheets, installation instructions, fire and smoke ratings. Submit schedule matching insulation type to mechanical systems and equipment.

1.04 INSULATION THICKNESS

- A. Insulate domestic hot water supply, tempered water, and hot water recirculating piping with insulation thickness of fiberglass piping insulation as shown below, ASTM C 547 Class 1, with All Service Jacket.
- B. Insulate domestic cold water Branches and Mains with insulation thickness as shown below of fiberglass piping insulation, ASTM C 547 Class 1.
- C. Insulate storm water piping and roof drains with 1" insulation thickness of fiberglass insulation, ASTM C 547 Class 1.
- D. Insulate condensate drain to HVAC units with 1" fiberglass insulation.

**To Meet or Exceed Energy Conservation Construction Code of the State of
New York**

THICKNESS TABLE

	<u>IPS 1-1/4" & Below</u>	<u>IPS 1-1/2" to 4"</u>	<u>IPS Above 4"</u>
Hot Water	1"	1-1/2"	1-1/2"
Hot Water Ret.	1"	1-1/2"	N/A
Cold Water	1"	1"	1"
Storm	1"	1"	1"

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver insulation, coverings, cements, adhesives and coatings to site in containers with manufacturer's stamp or label affixed showing fire hazard indexes of products.
- B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet installation, remove from project site.

PART 2 - PRODUCTS

2.01 DOMESTIC COLD WATER, HOT WATER, TEMPERED, AND HOT WATER CIRCULATING
PIPING

- A. Scope: Insulate all mains, branches, fittings, flanges and valves including those in ceiling spaces, pipe chases or spaces. Terminate insulation at the fixture supply stops. Insulate equipment connections to the equipment stop.
- B. Type:
 - 1. Pre-formed sectional type nominal 3# density glass fiber in standard 3' long sections tightly butted together. K factor (Thermal conductivity) of 0.23 at 75° mean. Make: Mansville, Owens-Corning, or Knauf.
- C. Finish:
 - 1. Main mechanical room piping and exposed risers and runouts in finished rooms: Factory-applied All Service Jacket with self-sealing laps.
 - 2. Valves, fittings and flanges: Equal thickness of fiberglass insulation with Zeston fittings covers or equal by Ham-Fab, Mansville.

2.02 STORM WATER PIPING - ABOVE GROUND

- A. Scope: Insulate all horizontal piping above ground including underside of roof drain bodies and all fittings.
 - B. Type: Pipe insulation shall be preformed sectional type nominal 3 pound density glass fiber in standard 3 foot long sections with a K factor of 0.23 at 75 mean and factory applied All Service
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Jackets. Seal joints with 3" All Service Jacket.

- C. Fittings & Drain Bodies: Insulate all fittings, hubs, flange and Drain bodies with fiberglass pre-moulded fitting insulation or with 1" resilient fiberglass blanket. (3/4) pcf density minimum) wrapped around the fitting or drain body, tied down with wire or jute. Compress blanket 50% in installation. Coat each fitting or drain body with two 1/8" coats of vapor barrier mastic reinforced with glass fabric extending 2" onto adjacent pipes.

2.03 METAL JACKETED PIPE INSULATION

- A. Scope: Pipe exposed to weather or physical abuse shall be insulated with .016" aluminum jacket over fiberglass insulation of the specified thickness. Sections shall be made in 36" lengths.
- B. Fire and smoke Hazard Classification shall not exceed flame spread index of 25 or less and smoke developed index of 50 or less as tested by ASTM E-84, NFPA 255 or UL 723.
- C. Manville Micro-Lok 650ML.

2.04 EQUIPMENT INSULATION MATERIALS

- A. Rigid Fiberglass Equipment Insulation: ASTM C 612, Class 2.
- B. Flexible Fiberglass Equipment Insulation: ASTM C 553, Type I, Class B-4.
- C. Jacketing Material for Equipment Insulation: Provide pre-sized glass cloth jacketing material, not less than 7.8 ounces per square yard, or metal jacket at Installer's option, except as otherwise indicated.
- D. Equipment Insulation Compounds: Provide adhesives, cements, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.
- E. Equipment Insulation Accessories: Provide staples, bands, wire, wire netting, tape, corner angles, anchors and stud pins as recommended by insulation manufacturer for applications indicated.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Apply insulation in accordance with the Schedule of Insulation on the Contract Specifications.
- B. Use only insulation and finish materials including adhesives, cements, and mastics which conform to the requirements of all local codes and ordinances.
- C. Fire resistant adhesive is highly flammable in liquid form. Eliminate welding, smoking, or other sources of ignition during application.

- D. Apply insulation after all piping pressure tests, as described in Piping Installation Procedure, have been completed.
- E. Clean surfaces of loose scale, dirt, oil, and other foreign matter and dry prior to insulating.
 - 1. Detail for space @ blowdown
 - 2. Detail for pipe @ insulation penetrating wall.
- F. Apply insulation to completely cover piping surface. Do not insulate over weld certification stamps.
- G. "Exposed" as used in this section means exposed to view. "Concealed" means concealed to view such as in furred chases or above suspended ceiling. Penthouse and equipment rooms are considered exposed locations.
- H. Fill surface imperfections in the insulation such as chipped edges, small joints or cracks, and small voids or holes with appropriate insulation material and smooth with skim coat of hydraulic-setting insulating cement. Vapor barriers shall be continuous and unbroken at hanger installations.
- I. Fit inside diameter of insulation sections or segments to outside curvature of pipe or previous insulation layer.
- J. Where standard insulation shapes are not available, cut, score, or miter segments of appropriate block to fit contour of pipe. Stagger joints of adjoining segments. Fit insulation carefully and secure with No. 20 gage galvanized annealed steel wire. Finish with a smoothing coat of hydraulic-setting insulating cement.
- K. Insulate valves, strainer, fittings, and flanges with identical material, density, thickness, and surface finish as the piping insulation. All edges shall be filled with filler and finished with a smoothing coat of hydraulic-setting insulating cement.
- L. Insulate the entire surface of fittings and strainers. Insulate valves up to and including bonnets, unless authorized otherwise by Project Engineer. Do not cover removable valve bonnets.
- M. Insulate strainers to permit removal of the basket without disturbing the insulation of the strainer body. Strainer covers shall be molded and taped to upper section of insulation.
- N. Bevel the ends of pipe insulation adjacent to flanges to permit bolt removal. Provide a collar of sectional block insulation over the flanges and extend a minimum of 2 inches over the adjacent pipe insulation. Fasten with staples to permit easy removal. Prior to applying collar fill annular spaces with loose insulation.
- O. Insulate all piping through sleeves.
- P. Where pipelines pass through masonry walls or floors, completely fill the space between outside of pipe or insulation and the

inside of the sleeve or framed opening with fibrous mineral wool or fiberglass pipe insulation.

- Q. When it is unavoidable and hangers for cold lines must be installed directly on the pipe, insulate and finish the entire hanger and the rod for a length of not less than 12 inches above the pipe.
- R. Apply insulation to completely cover metal surfaces.
- S. Cut, score, or miter insulation to fit shape and contour of equipment. Where surfaces are flat, cylindrical, or regularly curved, use premolded blocks or segments.
- T. Where required, provide permanently fastened angles or plates to support insulation.
- U. Apply insulation on cover plates, heads and access openings as separate sections, with insulation cut back for access to boltheads and other fasteners.
- V. Do not insulate over nameplates. Cut back insulation and line the insulation edges with 24 gage galvanized steel.
- W. Surface Finish.
 - 1. Apply surface finish to present a tight, smooth appearance.
 - 2. Do not apply sealant or cement until all previous applications of cement and adhesives have thoroughly dried.
 - 3. Extend surface finish to protect all insulation surfaces. Prevent raw edges or ends of insulation from being exposed.

3.02 INSTALLATION OF PIPING INSULATION

- A. Apply to pipes with side and end joints butted tightly per manufacturer's directions.
- B. Where joints in insulation occur, and at hangers, take extra precautions to seal the vapor barrier with adhesive BF 95-44 so that no moisture penetration will occur. Notify Engineer when insulation is complete so he may make inspection before walls are closed in or ceilings applied.
- C. Where fiberglass insulation is exposed in an occupied room, apply pre-sized glass cloth vapor barrier jacket in same manner using same type of adhesive (or use ASI/SSL).
- D. Repair all breaks in the jacket with 4" wide strip of vapor barrier jackets (FRGC or SSL as required) applied smoothly and securely. When applying adhesive at temperature below 75°F, use staples with an additional brush coat of adhesive over the exterior of the staples.
- E. Adhere 4" wide strips of jacket material smoothly and securely over all end joints with vapor barrier adhesive as above to insure a continuous vapor barrier.

- F. Apply insulation on all cold surfaces where vapor barrier jackets are used with a continuous, unbroken vapor seal. Insulate and vapor seal hangers, supports, anchors, etc., that are securely directed to cold surfaces to prevent condensation.

3.03 EQUIPMENT INSULATION

- A. Cold Equipment (Below Ambient Temperature)
 - 1. Application Requirements: Insulate the following cold equipment:
 - a. Domestic Hot water expansion tanks
 - 2. Insulate each item of equipment specified above with fiberglass: 2" thick
- B. Hot Equipment (Above Ambient Temperature)
 - 1. Application Requirements: Insulate the following hot equipment.
 - a. Hot water storage tanks
 - b. Water heaters (not insulated by manufacturer)
 - 2. Insulate each item of equipment specified above with fiberglass: 2" thick.

3.04 SUPPORT OF INSULATED PIPE LINES

- A. Scope: Install inserts at each hanger or support for all water lines for sizes 1-1/2" and up, or 16 gauge electro-galvanized carbon steel shields may be used in lieu of inserts. Install supporting devices on insulated lines with hangers with insulation shields.
- B. Inserts:
 - 1. Inserts between the pipe and pipe hangers shall consist rigid pipe insulation of equal thickness to the adjoining fiberglass insulation and shall be provided with vapor barrier where required.
 - 2. Insulation inserts shall not be less than the following lengths:
 - 1-1/2" to 2-1/2" pipe size, use 6" length
 - 3" to 6" pipe size, use 9" length
- C. Supporting Devices: Use cork stoppers, short lengths of wood dowels or wood blocks of the same thickness as insulation. Curve the support device surfaces to match the curve of the metal shield. Metal shields are provided with the hanger.

3.05 ADHESIVES, MASTIC, AND COATINGS

- A. Apply adhesives, mastic and coatings specified at the
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manufacturer's recommended coverage per gallon.

3.06 EXPOSED RISERS AND RUNOUTS

- A. Finish exposed risers and runouts in occupied rooms with ALL SERVICE JACKET.
- B. Occupied areas mean all areas except ceiling spaces, crawl spaces and closed off pipe spaces or chases.

3.07 EXISTING INSULATION REPAIR

- A. Repair damaged sections of existing mechanical insulation damaged during this construction period. Use insulation of the same thickness as existing insulation. Install new jacket lapping and seal over existing.

3.08 PROTECTION AND REPLACEMENT

- A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. Protection: Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.
- C. Surface Finish: No surface finish required.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15411A - PLUMBING DOMESTIC WATER PIPING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Extent of domestic water piping systems work is indicated on drawings and schedules, and by requirements of this section.
- B. Applications for domestic water piping systems include the following:
 - 1. Domestic cold water piping.
 - 2. Domestic hot water piping.
 - 3. Domestic recirculating water piping.
 - 4. Water hammer arresters.
 - 5. Valves.
 - 6. Pumps
- C. All domestic water piping systems must comply with the "Lead-Free" Division 15A Specifications. The contractor shall provide the required submittals for all equipment that will be part of the system prior to the equipment installation, and confirm on the jobsite that the equipment adheres to "Lead-Free" regulations.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's data for domestic water piping systems, materials and products.
- B. Submittals shall include but not be limited to the following:
 - 1. Valves
 - 2. Water hammer arresters
 - 3. Piping
 - 4. Pumps

1.03 QUALITY ASSURANCE

- A. Plumbing Code: Comply with applicable portions of New York State Uniform Fire Protection and Building Code, Article 9, Plumbing Requirements, State sanitary code, Department of Health, Division Sanitary Engineering, Bureau of Public Water Supply, any local codes or regulations, and the International Plumbing Code and the International Energy Conservation Code.
- B. All piping valves, hydrants, etc. shall comply with all ASME, ANSI, ASTM, AWWA and NFPA regulations that apply to the work.
- C. Meters, backflow preventers, hydrants, etc. shall conform to local utility company regulations, ordinances and laws, and the International Plumbing Code (IPC).
- D. Obtain all necessary approvals, certificates and arrange for all inspections required by local authorities having jurisdictions. Pay all fees.

- E. Perform water sampling upon completion of all piping systems. Samples to be analyzed by a NYS Dept. of Health approved lab for bacteria as well as all other code required chemical / organic analyses. The plumbing contractor will bear all costs associated with the testing procedures / reports. Test reports shall be included as part of the project closeout documents.

PART 2 - PRODUCTS
(All to comply with the 2015 IPC)

2.01 DOMESTIC WATER PIPING

A. Underground Water

1. 3" or larger: Class 52 ductile iron pipe per AWWA C151, with C104 cement lining, and asphaltic coating inside and out. Fittings shall be cast or ductile iron per AWWA C110, with push-on joints with four serrated silicon bronze wedges at each joint for electrical continuity. Underground type plastic line marker: Provide standard permanent bright colored, continuous-printed plastic tape, intended for direct burial service, not less than 6"wide X 4 mils thick, with lettering "WATER SERVICE".

2. 2" and smaller: Type 'K' copper soldered or brazed.

B. Domestic hot water, cold water and tempered water.

1. Type "L" copper, ASTM B88.
2. Make: Anaconda, or equal by Muller, Revere.
3. Fittings shall be wrought or cast solder type pressure fittings.
4. Chrome plated sponge cleanable brass, sch. 40 for exposed piping.

2.02 BALL VALVES

- A. Description: Bronze body, ball valve with 600 PSI W.O.G. min. rating, teflon seats, stainless ball, blow-out proof stem, viton-o-ring sealed union, removable operating handle and solder ends. Bronze materials to be "no lead" type, in conformance with the latest edition of NSF 61. ANSI372

2.03 INTERIOR HOSE BIBBS

- A. 'No-Lead', Anti-siphon vacuum breaker wall faucet enclosed in a flush mounting wall box, 3/4" male hose outlet, loose key opens box and faucet operator, chrome plated casting.
- B. Make:
- C. Josam or equivalent. Where indicated, install on cold water piping.

2.04 EXTERIOR WALL HYDRANTS

- A. 'No lead', Automatic draining, freezeless wall hydrant with an anti-siphon vacuum breaker enclosed in a flush mounting wall box. Cast bronze, ¾" male hose outlet, non-freeze, "water" on cover, key handle, proper length galvanized wall sleeve, vacuum breaker, wall clamp, chrome finish.
- B. Where indicated, install on cold water piping.

2.05 SWING CHECK VALVES

- A. General: Construct pressure-containing parts as follows:
 - 1. Bronze valves, 125 or 150 psi: ANSI/ASTM B 62. Bronze materials to be "no lead" type, in conformance with the latest edition of NSF 61. ANSI 372.
- B. Construct valves with disk seating angle 40° to 45° unless composition disc is specified. Provide stop plug as renewable stop for disc hanger. Construct disc and hanger as separate parts, with disc free to rotate. Support hanger pins on both ends by removable side plugs.
- C. Soldered ends 2" and smaller: Class 125, bronze body, screwed cap, horizontal swing, bronze disc.
- D. Flanged ends 2 1/2" and larger: Class 125, iron body bronze mounted, bolted cap, horizontal swing, cast iron disc.
- E. Manufacturers:
 - 1. Jenkins Bros., A Corp.
 - 2. Kennedy Valve.
 - 3. Lunkenheimer.
 - 4. Stockham Valves and Fittings, Inc.

2.06 SPECIAL VALVES

- A. Balance valve:
 - 1. Bronze/Brass Ball valve with pressure readout ports, calibrated nameplate and memory stop. Bronze materials to be "no lead" type, in conformance with the latest edition of NSF 61.
 - 2. Make: Bell & Gossett model CB, Watts
- B. Trap Primer Valve:
 - 1. 'No lead', Automatic, large port openings, activates on 10 psig pressure drop at 30-250 psig. Water release is factory set. Chrome plated finish.

2.07 THERMOMETERS AND GAGES

- A. Water Pressure Gages: 0-150 psi range, aluminum or brass 4-1/2" case, 1/4" NPT connection. Glass enclosed dial with 1/4" ball valve. 1 percent accuracy, ANSI B40.1, Grade A.
- B. Glass Thermometers
 - 1. General: Die cast aluminum, baked epoxy enamel finish, glass front, 9" long, adjustable joint, locking device. 1 percent accuracy, shock mounted. Copper plated steel or brass stem. Alcohol based thermometers to be used.
 - 2. Range:
 - a. Hot water: 30 to 240°F, 2°F divisions.
 - b. Cold water: 30 to 180°F, 2°F divisions.
 - 3. Thermometer wells: No Lead, Brass or stainless steel, 2" extension for insulated piping. Cap nut with chain fastened to thermometer well.

2.08 PLUMBING INSULATION

- A. General: Comply with Division 15A Section "15180A, Plumbing Insulation".

2.09 UNIONS

- A. Description: "No lead" Cast Brass with Solder Ends. Working pressure: 200 PSI W.O.G.
- B. Make: Nibco, or equal by Mueller, Revere.

2.10 SOLDER AND FLUX

- A. Solder shall be in solid wire form of Type II 95-5 tin antimony solder conforming to ASTM B-32, Grade 5A. Flux shall be a zinc chloride or a mixture of zinc and ammonium chlorides. Solders containing lead shall not be used. 96.5 - 3.5 and 95-5 tin/silver solders may be used.

2.11 SHOCK ARRESTER

- A. Construction:
 - 1. Type 1: Stainless steel body with stainless steel bellows, an air or argon gas cushion and with or without hydraulic displacement fluid.
 - 2. Type 2: "No lead" Hard drawn copper body, polypropylene piston with EPDM O ring seal and brass NPT threaded connection.
 - 3. Contractor may use either Type 1 or Type 2.
- B. Code Compliance: Shock absorbers shall comply with the following codes:
 - 1. P.D.I. - WH201 latest issue.
 - 2. ASSE 1010 latest issue.
- C. Make:
 - 1. Type 1: J.R.Smith 5000 Series.

2. Type 2: Watts LF15M2 -DR Series

PART 3 - EXECUTION

3.01 INSTALLATION OF DOMESTIC WATER PIPING MATERIALS AND PRODUCTS

- A. General: Install the following in accordance with Division 15A Section "Basic Materials and Methods".
1. Identification.
 2. Piping specialties.
 3. Supports, anchors and seals.

3.02 INSTALLATION OF PIPE, TUBE AND FITTINGS

- A. General: Install in accordance with Division 15A Section "Basic materials and Methods".
- B. Install in accordance with recognized industry practices, which will achieve permanently leak proof piping systems. Install each run with minimum joints and couplings. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16" misalignment tolerance. Comply with ANSI B31 Code for pressure piping.
- C. Hose faucets at low points. Cap with hose caps.
- D. Carry headers for groups of fixtures full size through their length.
- E. Swing joints as follows:
1. From water mains to risers.
 2. From riser to branch connections to fixtures.
 3. From riser to mains.

3.03 INSTALLATION OF SHOCK ARRESTORS

- A. General: Upright position, locations and sizes indicated in accordance with PDI Standard WH-201.

3.04 INSTALLATION OF STRAINERS

- A. General: Install full size of pipeline, in accordance with manufacturers installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers 2" and smaller installed ahead of control valves feeding individual terminals. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.
1. Locate plate-type strainer in supply line ahead of the water meter.

3.05 INSTALLATION OF VALVES

- A. General: Install where required for proper operation of piping and equipment, including all branch lines to isolate sections of piping. Locate to be accessible and separate support can be provided.
- B. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward for

- horizontal plane unless unavoidable.
- C. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.
 - D. Drain Valves: Each plumbing equipment item. Located to completely drain equipment for service or repair. Base of each riser, base of each rise or drop in piping system, at all low points, and where indicated or required to completely drain system. Provide hose caps on hose bibbs.
 - E. Check Valves: Horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction of flow.

3.06 INSTALLATION OF SPECIAL VALVES

- A. Balance Valves: Each hot water recirculating loop, and where indicated.
- B. Trap Primer Valves: Install in upright, vertical position in a convenient cold water line where indicated for floor drain primer supply.

3.07 INSTALLATION OF THERMOMETERS AND GAGES

- A. General: Install in accordance with manufacturer's instructions.
- B. Locations: Where indicated on Drawings.

3.08 INSTALLATION OF PLUMBING INSULATION

- A. Install in accordance with Division 15A Section "Plumbing Insulation".

3.09 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Hot and cold water runouts of sizes indicated, no smaller than required by the Plumbing Code.
- B. Mechanical Equipment Connections:
 - 1. Connect hot and cold water piping system to plumbing equipment as indicated.
 - 2. Comply with equipment manufacturer's installation instructions.
 - 3. Provide shutoff valve and union for each connection.
 - 4. Provide drain valve on drain connection.
 - 5. Exposed piping shall be sch. 40 chrome plated brass, sponge cleanable surface.

3.10 WALL HYDRANT AND HOSE BIBB INSTALLATION

- A. Wall hydrant: Install approximately 24" above finished grade or as noted on the plans. Install a stop and drain valve on each wall hydrant branch.
- B. Hose Bibbs for toilet and finished rooms: In rooms where shown with lavatories, install approximately 18" above finished floor under lavatory where indicated. Elsewhere, install 36" above the finished floor where shown. Install stop on branch. Hose bibbs to be furnished with loose key handles.

3.11 WATER SYSTEM DISINFECTION

- A. Scope: All newly installed lines carrying potable water and parts of existing systems which have been altered, extended or repaired prior to use.
- B. Before any use of system is made for domestic purposes, disinfect by one of the following methods as specified in the New York State Uniform Fire Prevention and Building Code. All water samples are to be sent to / tested by a New York State Department of Health approved lab for bacteria analysis. All test results shall be sent to the engineer for review prior to placing the systems in service.
 - 1. The system shall be filled with a water solution containing 50 parts per million of available chlorine and allowed to stand for 24 hours before flushing and returning to service.
 - 2. The system shall be filled with a water solution containing 200 parts per million of available chlorine and allowed to stand one hour before flushing and returning to service.
 - 3. For a potable water storage tank, where it is not practicable to disinfect by the foregoing methods, the entire interior of the tank shall be swabbed with a water solution containing 200 parts per million of available chlorine and allowed to stand for two hours before flushing and returning to service.
- C. Contractor shall provide test kit for residual chlorine.
- D. After contact period flush system with clear water until system tests no more than 0.2 PPM residual chlorine.

3.12 DOMESTIC WATER SYSTEM TEST

- A. Test in accordance with the requirements of Section 15985A - "Plumbing, Testing, Adjusting and Balancing."

3.13 SPARE PARTS

- A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bib, or faucet installed.

3.14 ADD LEAD TESTING NOTE

- A. Following the completion of the P.C. work scope, the owner shall have the water conditions tested for lead containments by a third-party testing firm to regulation 67.4 of the Department of Health regulations as part of Section 1417 of the Federal Safe Water Act to determine "Lead-Free" compliance and SED guidelines of less than 15 parts per billion.
- B. If the system does not comply with Sub-Part Regulation 67.4 of the DOH Section 1417 of the Federal Safe Water Act, the P.C. shall provide replacements at no additional cost, to then repeat the installation and testing requirements. The P.C. shall absorb the fee for the first lead testing procedure as well as the following confirmation procedures at no additional cost to the owner.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15412A - PLUMBING SANITARY PIPING SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Extent of soil, waste and vent piping system work, is indicated on drawings and schedules, and by requirements of this section.
- B. Applications for soil, waste and vent piping systems include the following:
 - 1. Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.
 - 2. Underground building drain piping including mains, branches, traps, connections to fixtures and drains, and connections to stacks, terminating at connection to sanitary sewer, 5'-0" from building wall, or where shown on drawing. Coordinate with site contractor.
- C. Trenching and backfilling is required in conjunction with underground and building drain piping is specified in applicable Division 15A sections, and is included as work of this section.

1.03 QUALITY ASSURANCE

- A. Plumbing code compliance - comply with applicable portions of New York State Uniform Fire Protection and Building Code, especially Article 9, Plumbing Requirements, State Sanitary Code, Department of Health, Division Sanitary Engineering, Bureau of Public Water Supply, any local codes or regulations that apply pertaining to plumbing materials, and the 2015 IPC especially Chapter 7.
- B. ANSI compliance - comply with applicable American National Standards pertaining to products and installation of soil and waste piping systems.
- C. PDI compliance - comply with applicable Plumbing and Drainage Institute Standards pertaining to products and installation of soil and waste piping systems.

1.04 SUBMITTALS

- A. Product data - submit manufacturer's data for soil and waste piping systems materials and products on the following:
 - 1. Pipe and Couplings
 - 2. Clean outs
 - 3. Floor drains
- B. Acceptable Manufacturers

1. Floor Drains
 - a. Jay R. Smith
 - b. Josam
 - c. Zurn
 - d. Watts
2. Couplings for no-hub pipe
 - a. Anaco
 - b. Tyler
3. Soil Pipe
 - a. Eastern Foundry
 - b. Tyler Pipe
 - c. Charlotte Pipe

PART 2 - PRODUCTS
(All to comply with the 2015 IPC)

2.01 SOIL AND WASTE PIPING MATERIALS AND PRODUCTS

- A. General - provide piping materials and factory fabricated piping products of sizes, types, pressure ratings and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections, provide fittings of materials which match pipe materials used in soil and waste piping systems. Where more than one type of materials or products are indicated, selection is Installer's option.

2.02 BASIC IDENTIFICATION

- A. General - provide identification complying with Specification Section 15057A, in accordance with the following listing:
1. Above ground soil, waste and vent piping - pipe markers.
 2. Underground building drain piping - underground type plastic line markers.

2.03 PIPE

- A. Below Ground:
1. Service weight cast iron with push-on gaskets, hub and spigot. Compression Gaskets shall conform to the requirements of ASTM Standard C564-14 and CISPI310.
- B. Above Ground:
1. Service weight C.I. soil pipe and fittings with no-hub joints. Make: Tyler pipe or equal by Eastern Foundry Co. Anaheim Foundry Co.
 2. Copper drainage tubing, type DWV, shall not be used on site.
 3. Exposed: Sch. 40 chrome plated brass, threaded, sponge cleanable.

2.04 COUPLINGS FOR NO-HUB PIPE

- A. Description: Type 304 stainless steel shield and 3/8" slot head 304 stainless steel screws. All other component metal parts shall be 304 stainless steel. The coupling sealing gasket shall be made of Neoprene as the sole elastomer. A cast iron coupling may be used.

Do not use under ground. Coupling shall meet or exceed CISPE Standard 310.

B. Make: Anaheim Co., Tyler Pipe.

2.05 BASIC PIPING SPECIALTIES

A. General - provide piping specialties complying with Division 15A Basic Materials and Methods section, in accordance with the following listing:

1. Pipe escutcheons.
2. Mechanical sleeve seals.
3. Pipe sleeves.

2.06 BASIC SUPPORTS AND ANCHORS

A. General - provide supports, anchors and seals complying with Division 15A Basic Materials and Methods section "Supports and Anchors".

2.07 CLEANOUTS

A. General

1. Units shall meet all design parameters shown on the drawings.
2. Units shall be complete with all design features and accessories necessary to provide a coordinated installation (such as carpet markers, tile recesses, etc.).
3. Units shall be of the following sizes:
 - a. Line size for piping to 4".
 - b. 4" for piping from 5" to 8".
 - c. 6" for piping 10" and larger.
4. Location:
 - a. At each bend of more than 45 degrees.
 - b. At bottom of soil or waste stacks and rainwater leaders.
 - c. At 50' intervals or less on horizontal pipe lines 4" or smaller.
 - d. At 50' intervals or less horizontal pipe lines 5" or larger.
 - e. At exit of sanitary and storm drains from building.
 - f. Wherever shown on the drawings.
 - g. At the end of each branch line serving more than two fixtures.
5. Placement: must be located where they will be accessible. Check general construction drawings for location of lockers or other equipment which may prevent access.

B. Cleanout Types

1. Deck Plate Cleanout:
 - a. Adjustable cast iron floor cleanout with inside caulk outlet, adjustable ABS housing, clamp device, internal tapered bronze cleanout plug, secured round scoriated nickel alloy cover plate. Jay R. Smith Figure 4020.
2. Wall Plate Cleanout:

- a. Exposed installation: Cast iron 'T' branch cleanout tee with bronze tapered plug. Jay R. Smith Fig. 4510
- b. Concealed installation behind plaster, dry or masonry walls: Provide cleanout tee with bronze plug tapped for center screw similar to exposed installation with polished vandalproof stainless steel access plate.

3. Cleanout:

- a. Cast iron cleanout with straight body for caulking into soil pipe hub and fitted with bronze plug countersunk or raised head as required.

4. Exterior Cleanout:

- a. Round coated cast iron access frame, heavy duty scoriated (vandalproof), secured cover. Coated cast iron cleanout ferrule with inside caulk connection and recessed tapered thread bronze plug.

2.08 FLOOR DRAINS

- A. Drains and traps shall be same size as waste pipes. Provide clamping devices for drain flashing. Provide P-trap in outlet from each drain, or as shown on drawings.
- B. Drain bodies to be cast iron.
- C. Floor drains shall be by Jay R. Smith, Zurn, Watts or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF BASIC IDENTIFICATION

- A. General - install plumbing identification in accordance with Specification Section 15057A.

3.02 INSTALLATION OF SOIL WASTE AND VENT PIPING

- A. General - install soil and waste piping in accordance with Division 15A Basic Materials and Methods section "Pipe, Tube and Fittings" and with Plumbing Code having jurisdiction.
- B. Solder joints use Type 1 solder.
- C. Insulate vent piping within three feet of passage through roof.

3.03 INSTALLATION DRAINAGE PIPING - SANITARY

- A. Changes in direction long sweep bends or 1/8 and/or 1/16 bends.
- B. Connections of branches to mains with "Y" fittings and 1/8 and/or 1/16 bends.
- C. All connections of horizontal into vertical piping with long turn sanitary "T-Y's".
- D. Grade the "horizontal" piping 1/4" per foot, minimum for 2 1/2 " or less, 1/8" per foot minimum for 3" and larger.

3.04 TURNS AND OFFSETS

A. Turns:

1. From vertical to horizontal:
 - a. Less than 3": Use long sweep or extra-long turn elbow.
 - b. 3" and larger: Use short sweep or 90° short turn fittings.
 - c. Horizontal piping: Use 45° wyes, long sweeps: 1/4, 1/6, 1/8 and 1/16 bends or any combination of same.
 - d. For vents in any direction; Use quarter bends or 90° short turn fittings.

B. Offsets:

1. Make offsets at no less than 45° angle to the horizontal in the following cases:
 - a. Offsets in stack vent portion of soil and waste stacks (above the highest fixture drainage connection).
 - b. Offset in vent stacks.
 - c. Grade the "horizontal" piping 1/4" per foot.
 - d. Connect all plumbing fixtures into sanitary house drain. No case shall soil or waste pass through more than one trap before entering house drain.

3.05 INSTALLATION OF VENT PIPING

- A. Provide vents shown and required by Plumbing Code.
- B. Grade vents to discharge water of condensation.
- C. Make offsets at 45 degree angle.
- D. Connect upper ends of drainage lines to vent system or extend through roof without decreasing size.
- E. Arrange vents and connections except wet vents, so not to carry drainage.
- C. Connect bottom to drains so drainage will wash out rust and scale.
- D. Extend vents above floor line to not less than 6" above flood rim of highest fixture before running horizontally.
- E. Terminate vents 18 inches above roof line.
- F. Increase pipes smaller than 3" to 3" from 18 inches below roof to terminus, using standard length tapered increasers.

3.06 INSTALLATION OF PIPING SPECIALTIES

- A. Install piping specialties in accordance with Division 15A Basic Materials and Methods section.

3.07 INSTALLATION OF SUPPORTS AND ANCHORS

- A. Install supports, anchors and seals in accordance with Division 15A Basic Materials and Methods section.

3.08 INSTALLATION OF DRAINAGE PIPING PRODUCTS

- A. Cleanouts - install in sanitary above ground piping and sanitary building drain piping as indicated, as required by Plumbing Code, and at each change in direction of piping greater than 45 degrees, at minimum intervals of 50' for piping 4" and smaller and 50' for larger piping, and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping.
- B. Flashing flanges - install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.

3.09 INSTALLATION OF FLOOR DRAINS

- A. General - install floor drains in accordance with manufacturer's written instructions and in locations indicated.
- B. Coordinate with soil and waste piping as necessary to interface floor drains with drainage piping systems.
- C. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
- D. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
- E. Position drains so that they are accessible and easy to maintain.

3.10 FLASHING

A. General

- 1. Flash openings with 6 lb. copper flashing.
- 2. Make watertight, allow for expansion and contraction.

B. Vent pipes

- 1. Extend not less than 12" from base of pipe.
- 2. Turn flashing over edge on cast iron; extend into same one (1) inch.
- 3. Ream coupling screw down over flashing at least one (1) inch screwed pipe.
- 4. Copper flashing assembly acceptable.

- C. Waterproof pipes through waterproof walls or floors: See details on drawings.

3.11 EQUIPMENT CONNECTIONS

- A. Piping runouts to fixtures - provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by Plumbing Code. Traps and tailpieces shall be chrome plated brass. Waste stubs out of wall (exposed) shall be sch. 40 threaded chrome plated brass. All exposed surfaces shall be sponge cleanable.

3.12 INSPECTION AND TEST

- A. New drainage piping shall be subjected to hydrostatic pressure test, see requirements in Section 15985, "Plumbing Testing, Adjusting and Balancing".

3.13 PROTECTION

- A. Protect drains during remainder of construction period, to avoid clogging with construction materials and debris and to prevent damage from traffic and construction work.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15440A - PLUMBING FIXTURES AND TRIM

PART 1 - GENERAL

1.01 SUMMARY OF ITEMS INCLUDED

- A. Extent of plumbing fixtures and trim work is indicated by drawings and by requirements of this section.
- B. Types of plumbing fixtures required for the project including but not limited to, the following:
 - 1. Water closets.
 - 2. Urinals.
 - 3. Lavatories.
 - 4. Sinks.
 - 5. Mop sinks.
 - 6. Electric water coolers.
 - 7. Specialty faucets.
 - 8. Showers
 - 9. Floor Drain
 - 10. Hose Bibbs
 - 11. Emergency Eye Wash/Showers
 - 12. Drinking Fountains
 - 13. Bathtubs
 - 14. Shower Bases
- C. Refer to Division 16 sections for electrical connections to following plumbing fixtures, not work of this section.
 - 1. Electric water coolers.
 - 2. Electronic flush valves and faucets.

1.02 SUBMITTALS

- A. Product Data: Submit Product Data and installation instructions for each fixture, faucet, specialties, accessories, trim etc.
 - 1. Clearly indicate rated capacities of selected models of water coolers.
 - 2. Identify compliance with specified ANSI, UL, ASHRAE and New York State Standards, Codes and Listings and Lead Free Standards. (NSF)
- B. Shop Drawings: Submit rough-in drawings. Detail dimensions, rough-in requirements, required clearances and methods of assembly of components and anchorages. Coordinate requirements with Architectural Woodwork shop drawings for fixtures installed in countertops and cabinets. Furnish templates for use in woodwork shop.
- C. Wiring Diagrams: Submit manufacturer's electrical requirements and wiring diagrams for power supply to units. Clearly differentiate

between portions of wiring that are factory installed and field installed portions.

- D. Color Charts: Submit manufacturer's standard color charts for fixture colors.

1.03 QUALITY ASSURANCE

- A. Plumbing code compliance: Comply with applicable portions of New York State Uniform Fire Protection and Building Code, especially Article 9, Plumbing Requirements, and any local codes or regulations that apply pertaining to plumbing material, and 2015 IPC.

- B. New York State Law plumbing fixtures to comply with New York State Conservation Law 15-0314.

- 1. Lavatory faucets: 0.5 gpm self-closing faucet, or a metering faucet which limits discharge to a maximum of 0.25 gallons per cycle.
- 2. Sink faucets: 2.2 gpm.
- 3. Urinal flush valves: .5 gal. per flush.
- 4. Water closets: 1.3 gal. per flush.
- 5. Shower Head: 2.0 gpm

- C. Plumbing fixture standards: Comply with applicable portions of National Standard Plumbing Code pertaining to materials and installation of plumbing fixtures.

- D. Codes and Standards

- 1. ASHRAE Standard 18: "Method of Testing for Rating Drinking Water Coolers with Self-Contained Mechanical Refrigeration Systems.
- 2. Add NSF Lead Free
- 3. ARI Standard 1010: "Self-Contained Mechanically-Refrigerated Drinking-Water Coolers".
- 4. ICC Standard A117.1-09: "Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People".
- 5. Public Law 90-480: "Architectural Barriers Act of 1968".
- 6. UL Standard 399: Standard for "Drinking-Water Coolers".
- 7. Public Law 101-336: "Americans with Disabilities Act".
- 8. ANSI A117.1 - Accessible and Usable Buildings and Facilities
- 9. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008.
- 10. ASME A112.6.1M - Supports for Off-the Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2002).
- 11. ASME A112.18.1 - Plumbing Supply Fittings; 2012.
- 12. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2013.
- 13. ASME A.112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use); 2008 (R2013).
- 14. ASME A112.19.5 - Flush Valves and Spuds for Water Closets,

- Urinals, and tanks; 2011
15. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
 16. NSF 372 - Drinking Water System Components - Lead Content; 2011

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store fixtures where environmental conditions are uniformly maintained within the manufacturer's recommended temperatures to prevent damage.
- B. Store fixtures and trim in the manufacturer's original shipping containers. Do not stack containers or store in such a manner that may cause damage to the fixture or trim.

1.05 SEQUENCE AND SCHEDULING

- A. Schedule rough-in installations with the installation of other building components.

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES

- A. General: Type, style, and material indicated, including stops, valves, faucets, strainers, wastes, escutcheons, bolts, screws, bushings, etc.
- B. Fixtures of same type must be furnished by single manufacturer.

2.02 MATERIALS

- A. Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, decoloration, or other surface imperfections on finished units are not acceptable.
- B. Fittings, trim and accessories to be copper or brass unless otherwise noted.
 1. Exposed or semi-exposed: Bright chrome-plated units.
 2. Escutcheons: Cast brass, bright chrome-plated with set screw.
- C. Stainless steel sheets: ANSI/ASTM A 167, Type 302/304, hardest workable temper.
 1. Finish: No. 4, bright, directional polish on exposed surfaces.
- D. Steel sheets for baked enamel finish: ANSI/ASTM A 591, coating Class C, galvanized bonderized.
- E. Steel sheets for porcelain enamel finish: ANSI/ASTM A 424, commercial quality, Type I.

- F. Galvanized steel sheet: ANSI/ASTM A 526, except ANSI/ASTM A 527 for extensive forming, ANSI/ASTM A 525, G90 zinc coating, and chemical treatment.
- G. Vitreous china: High quality, free from fire cracks, spots, blisters, pinholes and specks, glaze exposed surfaces, and test for crazing resistance in accordance with ANSI/ASTM C 554.
- H. Fiberglass: ANSI Z 124, smooth surfaced, with color selected by Architect/Engineer.
- I. Synthetic stone: High quality, free from defects, glaze on exposed surfaces, stain resistant.
- J. Manufacturer
 - 1. Fixtures: American Standard, Crane, Kohler, Eljer.
 - 2. Flush valves: American Standard, Sloan.
 - 3. Closet seats: Church, Beneke, Bemis.
 - 4. Chair carriers: Josam, Smith, Zurn.
 - 5. Supplies and traps: Fixture manufacturer or McGuire, Eastman Central D, Brass Craft, Bridgeport Brass.
 - 6. Master mixing valves: Powers, Symmons, Leonard.

2.03 PLUMBING FITTINGS, TRIM & ACCESSORIES

- A. Refer to the "Plumbing Fixture Schedule" on the contract drawings for plumbing fixture manufacturer / model number information.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify all dimensions by field measurements. Verify that all plumbing fixtures may be installed in accordance with pertinent codes and regulations, the original design and the referenced standards.
- B. Examine rough-in for potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures.
- C. Examine walls, floors and cabinets for suitable conditions where fixtures are to be installed.
- D. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install plumbing fixtures level and plumb in accordance with fixture manufacturer's written instructions, rough-in drawings and pertinent codes and regulations, the original design and the referenced standards.

- B. Comply with the installation requirements of ICC Standard A117.1, Public Law 90-480 and Public Law 101-336 with respect to plumbing fixtures for the physically handicapped.
 - 1. Water closets flush valve handle on open side of fixtures.
 - 2. Insulate water supply and drain pipes under wheelchair accessible lavatories and sinks or as otherwise shown on drawings.
- C. Fasten plumbing fixtures securely to supports or building structure. Secure supplies behind or within wall construction to provide rigid installation.
- D. Set following in a leveling bed of cement grout.
 - 1. Mop sinks.
 - 2. Tubs.
- E. Install a Lead Free stop valve in an accessible location in the water connection to each fixture.
- F. Install escutcheons at following locations:
 - 1. Wall penetrations, exposed finished locations.
 - 2. Floor penetrations, exposed finished locations.
 - 3. Ceiling penetrations, exposed finished locations.
 - 4. Within cabinets and millwork.
- G. Seal fixtures to walls and floors using silicone sealants or latex caulking. Match sealant color to fixture color.
- H. Install a sediment trap at each sink or grouping of sinks in Art Rooms. Install so that trap may be easily serviced and removed.

3.03 EQUIPMENT TO BE FURNISHED BY OTHERS

- A. Make complete plumbing connections to fixtures and equipment to be furnished by others. Secure exact locations and roughing-in dimensions before beginning work.
- B. Provide approved supplies with stops and escutcheons, cast brass traps and wastes with CO plug and escutcheon.
- C. All exposed piping chrome plated.
- D. Equipment shall be chrome plated except piping located below equipment.

3.04 FIELD QUALITY CONTROL

- A. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized.
- B. Inspect each installed unit for damage and operation. Replace damaged or faulting operating fixtures.

3.05 CLEANING

- A. Clean fixtures, trim and strainers using manufacturer's recommended cleaning methods and materials.

3.06 PROTECTION

- A. Provide protective covering for installed fixtures, water coolers and trim.
- B. Do not allow use of fixtures for temporary facilities unless expressly approved in writing by the Owner.

3.07 SPARE PARTS

- A. Furnish special wrenches, water filters and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt in a quantity of one device for each 10 fixtures.
- B. Furnish faucet repair kits complete with all necessary washers, springs, pins, and retainers, packings, O-rings, sleeves and seats in a quantity of 1 kit for each 40 faucets.

END OF SECTION

DIVISION 15a - PLUMBING

SECTION 15511a - FIRE STOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in/ joints between fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- A. Only tested fire stop systems shall be used in specific locations as follows:
 - 1. Penetrations for the passage of ductwork, cable, cable tray, conduit, piping, electrical bus ways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Safing slot gaps between edge of floor slabs and curtain walls.
- C. Openings between structurally separate sections of wall or floors.
- D. Gaps between the top of walls and ceilings or roof assemblies.
- E. Expansion joints in walls and floors.
- F. Openings and penetrations in fire-rated partitions or walls containing fire doors.
- G. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
 - 1. Section 03300 - Cast-In-Place Concrete
 - 2. Section 07900 - Joint Sealers
 - 3. Section 04200 - Masonry Work
 - 4. Section 09200 - Lath and Plaster
 - 5. Section 09250 - Gypsum Drywall Systems
 - 6. Section 13080 - Sound, Vibration and Seismic Control
 - 7. Section 13900 - Fire Suppression and Supervisory Systems

- 8. Section 15050 - Basic Mechanical Materials and Methods
- 9. Section 15250 - Mechanical Insulation
- 10. Section 15300 - Fire Protection
- 11. Section 15400 - Plumbing
- 12. Section 16050 - Basic Electrical Materials and Methods

1.05 REFERENCES

- A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 - 1. UL Fire Resistance Directory:
 - a. Fire stop Devices (XHJI)
 - b. Fire Resistance Ratings (BXUV)
 - c. Through-Penetration Fire stop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 - 2. Alternate "Omega Point Laboratories Directory" (updated annually)
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems" (July 1998.)
- D. Test Requirements: ASTM E 1966-01, "Standard test method for Fire Resistive Joint Systems"
- E. Inspection Requirements: ASTM E 2174 - 01, "Standard Practice for On-site Inspection of Installed Fire Stops."
- F. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- G. ASTM E-84-01, Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. All major building codes: ICBO, SBCCI, BOCA, and IBC.
- I. NFPA 101 - Life Safety Code
- J. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

- B. Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time).

1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

- E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
 - 1. Hilti, Inc., Tulsa, Oklahoma (or equal)
800-879-8000

2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type,

annular space requirements, and fire-rating involved for each separate instance.

- B. Cast-in place firestop devices for use with non-combustible and combustibile plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:
 - 1. Hilti CP 680 Cast-In Place Firestop Device
 - a. Add Aerator adaptor when used in conjunction with aerator ("sovent") system.
 - 2. Hilti CP 681 Tub Box Kit for use with tub installations.
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant
 - 2. Hilti CP 604 Self-leveling Firestop Sealant
 - 3. Hilti CP 620 Fire Foam
 - 4. Hilti CP 606 Flexible Firestop Sealant
 - 5. Hilti CP 601s Elastomeric Firestop Sealant
- D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
 - 1. Hilti CP 601s Elastomeric Firestop Sealant
 - 2. Hilti CP 606 Flexible Firestop Sealant
 - 3. Hilti FS-ONE Intumescent Firestop Sealant
- E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
 - 1. Hilti CP 672 Speed Spray
 - 2. Hilti CP 601s Elastomeric Firestop Sealant
 - 3. Hilti CP 606 Flexible Firestop Sealant
 - 4. Hilti CP 604 Self-leveling Firestop Sealant
- F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
 - 1. Hilti CP 677 Speed Plugs
 - 2. Hilti CP 767 Speed Strips
- G. Intumescent sealants, caulking materials for use with combustibile items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant

- H. Foams, intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti FS-ONE Intumescent Fire stop Sealant
 2. Hilti CP 618 Fire stop Putty Stick
 3. Hilti CP 620 Fire Foam
 4. Hilti CP 601s Elastomeric Fire stop Sealant
 5. Hilti CP 606 Flexible Fire stop Sealant
- I. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti CP 618 Fire stop Putty Stick
- J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti CP 617 Fire stop Putty Pad
- K. Fire stop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti CP 642 Fire stop Collar
 2. Hilti CP 643 Fire stop Collar
 3. Hilti CP 645 Wrap Strips
- L. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical bus ways in raceways, the following products are acceptable:
1. Hilti CP 637 Trowelable Fire stop Compound
 2. Hilti FS 657 FIRE BLOCK
 3. Hilti CP 620 Fire Foam
- M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical bus ways in raceways, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
- N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti CP 672 Speed Spray
 2. Hilti CP 601s Elastomeric Fire stop Sealant
 3. Hilti CP 606 Flexible Fire stop Sealant
 4. Hilti CP 604 Self-Leveling Fire stop Sealant

- O. Provide a fire stop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- P. Provide a fire stop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which fire stop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Fire stop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place fire stop devices without interferences.

3.03 INSTALLATION

- A. Regulatory Requirements: Install fire stop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL fire stop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing fire stop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess fire stop materials and soiling as work progresses.

END OF SECTION

DIVISION 15A - PLUMBING

SECTION 15985A - PLUMBING, TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provision of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Extent of testing, adjusting and balancing work is indicated by requirements of this section, and also by drawings and schedules.
- B. Component types of testing, adjusting and balancing specified in this section includes the following:
 - 1. Rough sanitary and storm piping.
 - 2. Water supply system.
 - 3. Gas system - Refer to 15488A

1.03 QUALITY ASSURANCE

- A. Installer - a firm with at least 3 years of successful testing, adjusting and balancing experience on projects with testing and balancing requirements similar to those required for this project.

1.04 REQUIREMENTS

- A. No system shall be covered or concealed until tested, approved.
- B. Pay for Permit and Inspection Fees required by Authority having jurisdiction.
- C. Test in presence of Owner's Representative and Plumbing Inspector.
- D. Prove tight for period stated or longer if required.
- E. Tests may be made in sections.

1.05 CODES AND REQUIREMENTS

- A. Comply with latest editions and applicable portions of International Plumbing Code, Local Plumbing Standards, New York State Building Code, especially Article 9, Plumbing Requirements and Plumbing Code.
- B. Comply with applicable portions of Standards for Waste Treatment Works, New York State.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide test equipment and materials necessary for tests.

PART 3 - EXECUTION

3.01 GENERAL

- A. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable.
- B. Test, adjust and balance systems and components as indicated, in accordance with procedures outlined below and in applicable standards. Test which follows shall be considered minimum standards.

3.02 TESTS & INSPECTIONS TO BE

- A. Rough Sanitary and Storm Piping.
 - 1. Stop openings, fill with water to top of highest vent. Water shall hold constant for two (2) hours.
 - 2. May be tested in sections using water pressure test.
 - 3. Test pressure shall be equal to at least 10 ft. water column at all points.
 - 4. Retest at least upper 10 ft. of next lower section.
 - 5. Compliance with the Department of Health Lead in Water Regulation is located on Drawings.
- B. Water Supply System.
 - 1. Fill, subject to 125 psig hydrostatic pressure at lowest level for two (2) hours.
 - 2. Fixtures shall not be connected into system during test.
 - 3. After fixtures are connected, test system for two (2) hours, at 75 PSIG or prevailing water pressure, whichever is higher.
 - 4. Regulate flow of water to each fixture.
 - 5. Adjust balancing valves on hot water system.
 - 6. Faucets, flush valves shall operate satisfactorily without waste of water, without objectionable noise.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16010 - GENERAL PROVISIONS

PART 1 - GENERAL

1.01 GENERAL

- A. Applicable provisions of the Conditions of the Contract shall govern the work of Division 16 and its related sections.
- B. Intent:
 - 1. The drawings and specifications are intended to provide for a complete and ready for operation electrical installation. However, both the drawings and specifications are for the Division 16 Contractor's guidance and are not intended to give every detail of the existing conditions or new installations nor do they describe every fitting required for the installation of the work. The Division 16 Contractor shall furnish, install, and place in workmanlike manner all equipment, accessories, supports, fittings, and all other material needed for the complete electrical installation. The Division 16 Contractor shall prepare such additional drawings as necessary or required for any purpose and shall submit them for the approval of the Engineer.
 - 2. Before submitting his proposal, the Division 16 Contractor shall be fully informed to the extent, character, and intent of the work to be done by him. No consideration will be granted for any misunderstanding of the material to be furnished or work to be performed. See also the applicable sections of the Conditions of the Contract.
- C. Verifying Existing Conditions:
 - 1. The Division 16 Contractor, before submitting his bid, shall examine the site to which this work is in any way dependent upon according to the intent of these specifications and accompanying drawings. He shall report to the Engineer, in writing, with his bid, any conditions which prevent him from performing his work. No "Waiver of Responsibility" for inadequate, incomplete, or defective work will be considered by the Engineer unless writing notice had been filed by the Division 16 Contractor with his bid.
- D. Cooperation:
 - 1. The work called for in this Specification and indicated on the accompanying drawings shall be carried on in conjunction with the continued operation of the building and shall be so arranged that its installation and operation will conform with and facilitate the early installation of the work.

2. The Division 16 Contractor shall bear the expense required to revise his work due to any failure to coordinate the installation of his work with that of the buildings operation.
3. The Division 16 Contractor shall be responsible for the distribution and information concerning his work as required for the prompt installation. The Division 16 Contractor will be held fully responsible for any delay in the work as to any information, etc. regarding his work as required. See also the applicable sections of the Conditions of the Contract.
4. The Division 16 Contractor shall assist the Owner in applying for any available rebates from manufacturer's, utility companies, etc. on equipment or materials installed under the contract. Provide all required documentation and assist in the completion of applications as required to complete the rebate process. All proceeds from rebates remain the property of the Owner.

E. Accessibility and Clearances:

1. The Division 16 Contractor shall inform himself fully regarding peculiarities and limitations of space for the installation the materials and equipment under Division 16. He shall verify all dimensions and conditions in the field and from rough-in drawings of the equipment manufacturer. No extra compensation will be allowed because of differences between actual dimensions and the sizes shown on the drawings.
2. The Division 16 Contractor shall see that all his equipment such as apparatus necessary to be reached from time-to-time for operation and maintenance are made easily accessible. All work shall be checked for interferences with beams, ducts, pipes, etc. prior to installation of any equipment.
3. Although the location of equipment may be shown on the drawings in a specific place, the construction of the building may disclose the fact that the location for this work does not make its position easily and quickly accessible. In such case, the Division 16 Contractor shall call the Engineer's attention to same before installing the work and shall be guided by the Engineer's instruction.

F. Protection of the Work:

1. The Division 16 Contractor shall effectively protect, at his expense, all materials and equipment, including his employees, during the period of construction and he shall be held responsible for all damage done to his work, until the same is fully accepted by the Architect. See also the applicable sections of the Conditions of the Contract.
2. The Division 16 Contractor shall exercise particular care insuring that work in progress, and notably switchgear,

shall not become wet from condensation or water for any source. Further, he shall protect work in progress from contamination, overspray, or other damage from other trades, including his own. All traces of such events shall be removed, remedied, or otherwise corrected to turn over the electrical system to the Owner in new condition.

G. Shop Drawings:

1. For Shop Drawing requirements, see the applicable sections of the Conditions of the Contract. In addition, The Division 16 Contractor shall submit all shop drawings within 30 days of signing Contract. Generally, all equipment and materials of the same classification, type, or kind shall be submitted at one time in a bound brochure. All shall include a minimum of special shop drawings and shall be accomplished by a written detailed sequence of operation together with schematic wiring diagrams which shall show the functions, facilities, operation, and inter-connections of the equipment. Shop drawing submission not including this information will not be considered. Any construction delays caused by failure to submit shop drawings on time or in the proper format shall be the responsibility of the Division 16 Contractor.
2. Engineer/Architect review of contractor submittals and shop drawings is for general conformance with the design concept of the project and for compliance with the information provided in the Contract Documents. The Contractor is responsible for confirming all quantities and fit. Engineer / Architect acceptance of quantities provided in the Contractor's Submission shall not be used as basis of Change Order.
3. Contractor submission of equivalent or substitute items other than those specified is at Contractor convenience only. If a substitution or equivalent is accepted, the Contractor shall coordinate the installation of the substitute or equivalent and make all associated changes required. The Contractor also waives any claim for additional costs associated with the substitute / equivalent which becomes apparent before, during or after installation. The Contractor agrees to bear any and all additional costs to all other contractors or subcontractors which are caused by the incorporation of the substitution / equivalent.

H. Guarantee:

1. For guarantee requirements, see the applicable section of the Conditions of the Contract.

1.02 SPECIAL CONDITIONS

- A. This Contractor, as well as subcontractors for his work, must carefully read the "Instructions to Bidder" and study the plans and specifications.
- B. It is the intention of these specifications and the drawings accompanying same that they shall provide for the furnishing and installing of the indicated items complete as specified and as shown. Any work on the drawings, particularly described in these specifications, or vice versa, or any work or change which may be evidently necessary to complete the installation shall be furnished by the Contractor as being included in this Contract.
- C. During the course of the work, should any ambiguities or discrepancies be found on the drawings or in the specification, to which the Contractor has failed call attention before submission of his bid, than the Engineer shall interpret the intent of the drawings and specifications, and the Contractor hereby agrees to abide by the Engineer's interpretation and agrees to carry out the work in accordance with the decision of the Engineer. It is expressly stipulated that neither the drawings nor the specifications shall take precedence, one over the other, and it is further stipulated that the Engineer may interpret or construe the drawings and specifications of the work, and of that question, the Engineer shall be the sole judge.
- D. This Contractor shall provide and erect all sheds for the storage of his materials and provide temporary office for plans, details, records, etc. He shall furnish all scaffolding and equipment required for the installation of his work.
- E. Where no specified kind or quality of material is given, a first class standard article as approved by the Engineer shall be furnished. The drawings and specifications do not undertake to illustrate or set every item necessary for the work, as it is assumed that the Contractor is expert in the several lines of the work and is capable of interpreting them.
- F. Small details not usually shown or specified but necessary for a proper installation and finishing shall be included in the Contractor's estimate, the same as if hereby specified or shown.
- G. This Contractor assumes the responsibility to fit his equipment into every space regardless of discrepancies in the plans and/or specifications unless he notified the Engineer in writing, prior to the acceptance of his bid, of these discrepancies.

1.03 WORK INCLUDED

- A. These specifications and the accompanying drawings are intended to include the furnishings of all labor, materials, tools, hoists, transportation, equipment apparatus, and all required appurtenances and incidental auxiliaries necessary for the installation of the electrical work in a safe, substantial, workmanlike manner, complete in every detail, tested, programmed and ready for satisfactory operation.

- B. Any equipment called for in these specifications and not shown on the drawings and vice versa shall be furnished and installed complete as would any equipment both specified and shown. Generally, the work under Division 16 shall include, but shall not necessarily be limited to, the following items. Omission of specific items shall not be construed as being omitted from Division 16.

1.04 CODES, PERMITS, AND CERTIFICATES

- A. All work, material, and equipment under Division 16 shall comply with the current applicable requirements of an approved electrical construction agency serving the locale of the project, the service utility company, all State and Municipal agencies having jurisdiction, UL label equipment requirement, and to the 2017 edition of the National Electrical Code / NFPA 70.
- B. Before submitting his bid, the Division 16 Contractor shall familiarize himself with the rules of all herein before mentioned Boards, Departments, Agencies, etc. having jurisdiction, and he shall notify the Engineer with his bid, if in his opinion any work or materials specified is contrary to any such rules. Otherwise, the Division 16 Contractor shall be responsible for the approval of all work or materials and in case the use of any material specified is not permitted, a substitute approved by the authorities and by the Engineer shall be furnished and installed without additional cost to the Owner.
- C. The Division 16 Contractor shall procure and pay for all necessary drawings, permits, and certificates required by the various governing agencies having jurisdiction and shall turn over to the Engineer all permits for construction before starting work and certificates of test, inspection, and approval before requesting payment.

1.05 TESTS

- A. All tests required by the National Electrical Code, approved Electrical Inspection Agencies, State and Local Authorities, the servicing Utility Company, and the Engineer shall be executed by or paid for by the Division 16 Contractor. Furnish all labor, material, and instruments for each test. All major tests shall be witnessed by the Engineer and/or the Authority having jurisdiction, all of whom shall be given a minimum of one week's written notice prior to such tests.
- B. During the course of work and prior to final acceptance, all such tests shall be made as specified above and as to the Engineer deems necessary to insure that the Electrical Work meets with the intent of these specifications and is approved by the Authority having jurisdiction. Should the tests show that any of the material, apparatus, or workmanship is not first class or not in compliance with these requirements, the Division 16 Contractor, on notice from the Engineer shall remove same and promptly replace them with other materials and apparatus in conformity to the requirements.

- C. All circuit work, throughout, on all systems shall be tested for grounds and short circuits, prior to being energized, and all work shall be left in first class operating condition when energized. All other tests shall be as specified above and/or specified elsewhere herein.
- D. Tests of electrical work shall be made as equipment is installed.
- E. Provide complete functional testing and documentation of installed lighting controls in accordance with NYECC Section C408.3.

1.06 DEMONSTRATION OF THE COMPLETED ELECTRICAL WORK

A. Instruction Demonstration:

- 1. The Division 16 Contractor shall be fully responsible for the instructing of the Owner's designated personnel in the operation and maintenance of the all equipment furnished by him. All costs required for such instruction and demonstration shall be paid for by the Division 16 Contractor. Such instruction shall take place in the presence of the Engineer's representative, upon completion of the work, when the Division 16 Contractor and his equipment manufacturers and/or vendors shall arrange a demonstration of all electrical systems and equipment for the Owner's design representatives and shall furnish for their use, Engineer approved, printed and bound copies of all operation and maintenance construction manuals. Included in these manuals shall be one (1) copy of all previously submitted and Engineer "Approved" or "Approved as Noted" shop drawings ("Approved as Noted" shop drawings must first be permanently corrected). Informal or non-Engineer witnessed instructions or instructions to non-designed Owner personnel shall not be recognized as fulfilling these requirements.

B. Final:

- 1. The Division 16 Contractor shall, before payment is received, clean the installed electrical equipment; he shall assure that all guarantees and record drawings, have been prepared and approved; that all instructions have been given and that all demonstrations have taken place.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16100 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL

A. Standards for Materials and Workmanship:

1. All materials and workmanship shall, at a minimum be in accordance with (in no order of precedence):
 - a. National Electric Code (NFPA 70) - latest edition as adopted by the Authority Having Jurisdiction, unless otherwise noted.
 - b. State and municipal Building Codes and related subcodes.
 - c. Occupational and Safety Act (OSHA) Requirements.
 - d. Rules and Regulations of the Authority Having Jurisdiction applicable to the work.
 - e. National Electrical Standards Association Standard for Good Workmanship in Electrical Construction (NECA-1)
 - f. Serving utility's rules and regulations for providing service.
 - g. Contract Drawings and Specifications.
 - h. Manufacturer recommended installation instructions, practices and procedures for the products being utilized or installed.

Where conflicts arise between the above, the more stringent requirement shall be adhered to.

2. Except where existing materials and equipment are called for to be reused, all materials and equipment furnished and installed under Division 16 shall be new, of standard first grade quality, and correctly designed for their specific purpose. All new materials and equipment shall conform to the standards of and be listed/labeled by a Nationally Recognized Testing Laboratory (NRTL) such as Underwriters Laboratories (UL) and shall be approved for use by all local authorities having jurisdiction.
3. All equipment and material furnished shall be the manufacturer's standard item of production unless specifically specified or required to be modified to suit job conditions. Size material; finish dimensions, and the capacities for the specified application shall be published in catalogs for national distribution by the manufacturer. Ratings and capacities shall be certified by a recognized American rating bureau.
4. Equipment and material fabricated specifically for use on this project shall be in strict accordance with the Drawings and Specifications and shall conform to the latest

standards of the National Electric Manufacturer's Association.

5. All materials and equipment of one and the same kind, type, or classification and used for identical purpose shall be made by the same manufacturer.
6. All equipment and materials to be installed under Division 16 shall be done so in a workmanlike manner in accordance with recognized workmanship standards and shall present a neat and professional appearance when completed. Any workmanship considered by the Engineer as being faulty or as not being first class shall be removed and replaced by the Division 16 Contractor to the satisfaction of the Engineer at no additional cost to this Owner.
7. Within 30 days of Contract signing and prior to the submission of shop drawings or the purchase of any material or equipment, the Division 16 Contractor shall submit to the Engineer a detailed list of all items of materials and equipment, which he proposes to furnish under Division 16. Such a list shall bear the equipment manufacturer's name, general description or series catalog number, and intended location or use of same. In addition, furnish a list of distributors who will be providing equipment for this project.
8. Where particular products or materials are specified hereinafter by manufacturer's name, they shall be considered as the standard and as most satisfactory for their purpose of use on the site or in the building. Another manufacturer's product other than those indicated may be submitted for substitution with the understanding that the Engineer shall be the sole judge as to the acceptability of the substituted items. In addition, furnish to the Engineer or Owner upon request, and within 14 days of such a request, samples of any Base Bid and/or corresponding Alternate Bid or intended substitute equipment, fixtures, etc. for their comparison and selection.

1.02 CUTTING AND PATCHING AND REPAIR

A. General

1. The Division 16 Contractor shall be responsible for the removal and replacement of existing ceiling, wall and flooring systems as required to perform the work, unless otherwise noted. Prior to disturbing the area, notify the Owner of any pre-existing damaged, stained, degraded finish materials or areas, such that pre-existing conditions can be documented and for Owner option to provide replacements for re-installation.
2. When applicable to project conditions, removal of existing hung ceilings shall be done with care and stored in a

controlled location for future reinstallation under this Contract. Any ceiling tile damaged as a result of this work shall be replaced by the Division 16 Contractor (at no additional cost to the Owner).

3. All cutting required to facilitate the proper installation of all work to be installed under Division 16 shall be done by the Division 16 Contractor. All cutting shall be done in the manner specified and/or directed and approved by the engineer and only after permission of the Engineer is obtained. The installation of sleeves, chases, etc. in concrete walls, floors, ceilings, and roofs as well as the cutting of existing concrete walls, floors, ceilings, and roofs shall be done by core drilling. All patching will be the responsibility of this Contractor.
4. Any penetrations through fire rated areas shall be accomplished using 3M or Hilti fire barrier products in sheets, strips, or caulk (i.e., USG Fire Stop System (that meets ASTM, UL, and FM standards.
5. Where the Division 16 Contractor's demolition, relocation or replacement activities result in bare areas remaining exposed, the Division 16 Contractor shall be responsible to patch, prime and paint, or otherwise repair the exposed areas as required to match the adjacent areas. Remove unused anchors and fasteners and patch appropriately. Prime and paint as required to match the adjacent area.
6. All costs for the above shall be included in bid price.

1.03 WATERPROOFING

- A. Wherever any of the work of Division 16 has to pierce any waterproofing, this work shall be done by the Division 16 Contractor with care and after the part of these systems have been put in place through this waterproofing, the opening made by same shall be waterproofed and made absolutely water-tight as approved by the Architect and/or as hereinafter specified.
- B. Conduits piercing the cement waterproofing of wall and floors shall be provided with waterproof conduit entrance seal sleeves around same. These sleeves shall be Type "WSK" (walls) or "FSK" (floors) as manufactured by O-Z or other approved.
- C. Conduit sleeves through non-waterproofed walls and floors shall be grouted, caulked with oakum, and sealed with approved semi-plastic mastic compound on both sides of the wall.

1.04 CONDUIT, RIGID AND FLEXIBLE

- A. All conduits installed on the site or in the building shall be of the highest quality, free from defects, and listed by a NRTL and bear the manufacturer's mark or stamp. The Division 16 Contractor shall check the details of other Division and also the various Vendors' and Manufacturers' approved layouts for the exact

locations of all equipment, motors, etc. and shall terminate his conduit turns as shown thereon and as directed.

1. Thin Wall Steel Electrical Metallic Tubing, EMT (galvanized inside and outside).
 - a. All areas where conduit is concealed in walls or hung ceilings and allowed by Code.
 - b. All areas where conduit is exposed on walls or ceilings and allowed by Code. (Except otherwise noted on drawings).
2. Flexible Metal Clad Cable, MC (galvanized steel inside and outside).
 - a. Run concealed in ceiling and non-masonry partitions as indicated by the special symbol and for the particular wiring systems indicated on the drawings. Provide conduit sleeves or junction box conversion to pipe and wire for extension of these runs from ceilings into masonry partitions for switch legs and similar case. In no case shall MC be permitted for wiring sizes larger than No. 10 AWG or quantities greater than four (4) conductors in a single armored cable, furnish and install a flexible steel conduit (Greenfield) with the required number of conductors for that particular armored cable run in order to comply with the requirements for this paragraph and NEC Codes.
 - b. **Use of aluminum clad MC Cable is disallowed.**

B. The Drawings indicate the general location of conduit runs which may be modified at the time of installation to adapt same to building construction or site configuration but in no case shall circuits be combined without permission from the Engineer. Minimum size conduit for rigid steel, thin wall steel, flexible steel, or rigid **non-metallic conduit shall be ¾-inch** unless indicated otherwise on the Drawings. All rigid steel, thin wall steel, and rigid non-metallic conduit corners shall be turned with standard elbows or long radius bends. For all sizes of conduit larger than one inch, use standard manufactured elbows and offsets made for this purpose. For one inch and smaller sizes, the Division 16 Contractor will be permitted to make bends, but care must be taken not to damage the conduit. The radius of the inner curve on any bend shall be not less than allowed by Code. No more than four (4) right angle bends shall be permitted in any conduit run between any two (2) terminations or pull boxes.

C. The ends of all conduits shall be carefully reamed before installation and after the application of the dies and shall be free from burrs and sharp edges. Where it becomes necessary to cut a length of conduit, it shall be done with a hacksaw or other approved cutter and care shall be taken to secure a straight end on all conduits so that all conduit joints can and

will be brought to a shoulder. In installing all conduits, particular care must be taken in cutting to the proper length so that the ends will fit exactly into the outlet boxes and cabinets. Where conduits terminate in cabinets, they shall be neatly arranged. The ends of all conduits shall be immediately temporarily plugged after installation with plugs similar to T & B Series 1471, size as required, so as to avoid the conduit filling with earth, mortar, dust, etc.

- D. All conduits shall be furnished complete with all required size associated or elsewhere herein under Grounding. Joints in rigid steel conduit shall be made with threaded type steel coupling made up with Thomas and Betts Krop-Shield compound. Terminations of rigid steel conduit shall be made with double steel locknuts and insulated galvanized steel grounding type bushing, Thomas & Betts Series 3800 or other approved made with the threading compound specified above where required. Running threads on rigid conduit shall not be permitted; therefore, where straight threads cannot be used, approved type unions shall be installed. Joints in thin wall steel conduit shall be made with steel compression type couplings and connectors. Terminations of thin wall steel conduit shall be made with a single steel locknut, a compressions type steel connector and an insulated galvanized steel grounding type bushing, Thomas & Betts Series 5100 and Series 3800 or other approved. All fittings for flexible steel conduits and flexible armored cables shall be of the standard steel set screw and single locknut type or of the steel double locknut 'O' ring type and shall be approved for grounding purposes by the Local Inspector. Fittings for rigid non-metallic conduit shall be of non-metallic thread type and/or of the non-metallic solvent weld type. Where required, provide cast or installed above grade or within building(s). The ends of conduits terminating at motors, starters, and similar apparatus and devices shall be furnished with fittings as specified above and suitably required in each case. Provide expansion fittings on all conduits passing through or crossing building expansion joints. Expansion fittings for steel, conduits shall be OZ Catalog No. "DX (rigid) and TX (thin wall) or other approved. Expansion fittings for non-metallic conduits shall be of the 'O' ring non-metallic expansion coupling type as manufactured by Carlon or other approved. Care shall be taken to secure a straight end on all conduits so that all conduit joints can and will be brought to a shoulder. In installing all conduits, proper care must be taken in cutting to the proper length so that the ends will fit exactly into the outlet boxes and cabinets. Where conduits terminate in cabinets, they shall be neatly arranged. The ends of all conduits shall be immediately temporarily plugged after installation with plugs similar to T & B Series 1471, size as required, so as to avoid the conduit filling with earth, mortar, dust, etc.

- E. All conduits shall be furnished complete with all required size and associated fittings. Joints in rigid steel conduit shall be made with threaded type steel coupling made up with Thomas & Betts Krop-Shield compound. Terminations of rigid steel conduit shall be made with double steel locknuts and insulated galvanized steel ground type bushing, Thomas & Betts Series 3800 or

otherwise approved made up with the threading compound specified above where required. Running threads on rigid conduit will not be permitted; therefore, where straight threads cannot be used, approved type unions shall be made with steel compression type couplings and connectors. Terminations of thin wall steel conduit shall be made with a single steel locknut, a compression type steel connector and an insulated galvanized steel grounding type bushing, Thomas & Betts Series 5100 and Series 3800 or other approved. All fittings for flexible steel conduits and flexible armored cables shall be of standard steel set screw and single locknut type or of the steel double locknut 'O' ring type and shall be approved for grounding purposes by the Local Inspector. Fittings for rigid non-metallic conduit shall be of the non-metallic thread type and/or of the non-metallic solvent weld type. Where, required, provide cast non-metallic support fittings for all rigid non-metallic conduits installed above grade or within building. The ends of the conduits terminating at motor, starters, and similar apparatus and devices shall be furnished with fittings as specified above and as suitably required in each case. Provide expansion fittings on all conduits passing through or crossing building expansion joints. Expansion fittings for steel, conduit shall be OZ Catalog No. "DX" (rigid) and "TX" (thin wall) or other approved. Expansion fittings for non-metallic conduits shall be of the 'O' ring non-metallic expansion coupling type as manufactured by Carlon or other approved.

- F. The conduits for all branch circuit and feeder wiring shall be run concealed except in machine rooms, boiler rooms, equipment rooms, and similar space; where indicated or specified otherwise; where the lack of a hung ceiling and the presence of mechanical equipment and ducts makes a concealed installation from the slab impossible or impractical; where permission is granted by the Engineer to run exposed. Exposed conduits shall run parallel to walls and ceilings using hot dipped galvanized conduits, fittings, or pull boxes for taps and direction changes. All exposed conduits must be securely fastened in place by means of substantial galvanized supports and fasteners. Where conduits are to be fastened to masonry walls, ceilings, or partitions, the use of wooden plugs will not be permitted; provide malleable iron pipe clips with screws and expansion sleeves. Banks of conduits shall be supported from Unistrut trapeze hangers fastened to structural member by rods. The arrangement and method of fastening all conduits shall be subject to the direction and approval of the Architect and shall be supported free from outlets, pull boxes, etc. No "Hit On" clamps or squeeze connections shall be accepted. All fittings shall be nut and bolt connected.

1.05 WIRE AND CABLE

- A. Furnish and install all wire and cable for receptacles, equipment, panels, etc. for a complete wiring system as indicated on the Drawings and as required and specified.
- B. All wire and cable shall be new, manufactured of soft drawn copper of not less than 98% conductivity, conforming to ASTM

specifications and the latest requirements of N.E.C. Wire, and cable shall have 600 volt insulation (unless otherwise noted or specified) of the type specified and shall be of the standard AWG sizes as called for on drawings or specified. All wire and cable shall be delivered to the site or the building(s) in their original unbroken packages or reels plainly marked or tagged as follows:

1. Underwriters' labels and words "National Electrical Code Standard."
 2. Size, code type, insulation, and maximum working voltage of the wire.
 3. Name of manufacturing company and the trade name of the wire.
 4. Date of manufacture (month and year) which shall be within eight (8) months of installation.
- C. 600 volt class wire and cable shall be as manufactured by American Insulated Wire, Triangle, General Cable, or Anaconda. High voltage cables, 5,000 volts and above shall be as specified by the local electric utility and as may be further specified by the engineer when such specification section is included in this project manual.
- D. Wire and cable insulation shall be as follows and, in all cases, the insulation shall be suitable for the operating temperature of the equipment served.
1. No. 12 AWG and larger, dry locations: **THHN**.
 2. No. 12 AWG and larger, wet location in conduit direct bury or in conduit in concrete slabs on earth: **THHW**.
 3. For service conductors serving local utility equipment and all service related CT cabinet, disconnectors and or main distribution center: **XHHW** or **USE**.
 4. For continuous runs in fluorescent fixtures listed as a raceway or installed in non-plenum spaces: **RHH**, or **THHN**.
 5. For recessed outdoor lighting fixtures: **XHHW** (to junction box in hung ceiling).
 6. For recessed indoor lighting fixtures: **AF** or **THHN** (to junction box in hung ceiling).
 7. Areas of high ambient temperature (i.e., boiler rooms, auxiliary heater rooms, etc.): **RHH**.
 8. Within 3 feet of boilers, heater, etc.: **AVA**.
 9. Special systems (fire alarm, sound, etc.): Size and insulation as specified and/or indicated on the Drawings for each special system. All such wiring shall be plenum rated.

10. Pendants and flexible cords: SJ or SJO (both with ground wire).
11. Other wire and cables: All other wire and cable shall be as indicated on the Drawings or as required by the particular equipment manufacturer or Utility Company.
- E. Unless otherwise noted or indicated all light and power wiring shall be #12 AWG size: light and power wiring home runs shall be #10 AWG if longer than 100 feet measured between the local switch and the panelboard or the nearest outlet and the Panelboard. All cable #8 AWG and larger shall be stranded: all wire #10 AWG and smaller shall be solid.
- F. All wire and cable #6 AWG and small shall be factory color coded. Cables #4 AWG and larger shall be field color coded utilizing colored pressure sensitive tape at switchboards, panelboards, pullboxes, junction boxes, outlet boxes, and equipment served. Colors for each phase and neutral shall be consistent throughout the system. Where two or more neutrals are run in any one conduit, each neutral shall be taped to associated line conductors in each outlet. Neutrals and/or ground may not be combined and shall be installed continuous to panelboards, switchboard, etc. Each circuit on the drawings has been given a reference number. Connections at Panelboard, distribution equipment, etc., shall be that no neutral wire or cable shall serve more than one branch circuit wire or cable from the same phase. Color code, where not otherwise required by the inspection authorities, shall be as follows (where multiple circuits are run in a single conduit, additional color sequence shall be provided as approved):

	<u>120/208V</u>	<u>277/480v</u>
Phase A	Blue	Brown
Phase B	Black	Orange
Phase C	Red	Yellow
Neutral	White	White or Gray
Traveler or Switch Leg	Black with red colored stripe	Black with red colored stripe
Ground	Green	Green

- G. All polyphase installations shall be phase rotation checked before and after work conduct to assure connect rotation or maintenance of existing rotation, as suitable. Verify correct phase rotation prior to activating any 3-phase device.

1.06 WIRE AND CABLE CONNECTIONS AND DEVICES

- A. Feeder circuit cables shall be continuous from distribution equipment, etc. to panel, etc. served. Splicing and intermediate

pull boxes and manholes will not be permitted without the written permission of the Engineer. Branch circuit wiring shall be continuous except splices will be permitted at outlets, junction boxes, etc. six hundred volt, solderless mechanical splicing devices, as hereinafter specified, shall be used for splicing joints, taps, and connections of 600 volt wire and cables used for feeder and branch circuit wiring. The same devices shall be used for splicing joints, taps, and connections of sound, fire alarm, and other special system wire and cables except at terminal strip cabinets, sound racks, etc. where such connections shall be made with the terminal strips specified with the strip cabinets, etc. Wire nuts or crimp-on connectors shall not be permitted for splicing. Sufficient slack wire and cable shall be left for all outlets, distribution equipment, panelboards, controllers, amplifiers, control panels, etc. to facilitate connections to device or equipment served without putting a strain on the wire or cable. For wire #8 AWG and smaller, use steel spring solderless connectors with semi-rigid insulating shell taped with vinyl Scotch #88 tape (Scotch brand "Scotchlok" Types "Y", "R", and "B" as required or other approved). For cable #6 AWG and larger, use heavy duty Hy-press Barrel crimping tubes, (Thomas & Betts, Burndy, O.Z., or other approved). All connections shall be insulated with 3m type cold shrinks or other approved heat shrinks. The method used must provide insulation equivalent to 150% of the conductor's insulation. Other devices used for splicing other special wires and cables shall not be as specified elsewhere herein. **Use of split bolt connectors (bug nuts) is disallowed.**

- B. All wires and cables within all panelboards, distribution equipment control panels, terminal strip cabinets, pullboxes, junction boxes, outlets, and other equipment shall be neatly laced and bound in an orderly, workmanlike manner with Thomas & Betts Ty-rap and identified using Thomas & Betts E2 code self-laminating type Series WSL vinyl wire markers.
- C. No wires or cables shall be installed in conduits until conduits are free from condensate, moisture, and/or water. The only permissible wire pulling lubricant is Ideal Industries "Yellow 77."
- D. All circuits, regardless of being in conduit of any type, shall contain a bond wire. Use of (metallic) conduit as a bond is disallowed.

1.07 OUTLET BOXES

- A. Furnish and install an outlet box for each and every outlet, device fixture, etc. called for on the drawings, specified and required by Code. Outlet boxes shall be approved design, construction, form and dimension suitable for its specific location, the kind of wiring device, fixture, etc. to be used, the number of wires contained, and the arrangement type conduit and/or raceway they are connected to.
- B. Unless noted otherwise, hereinafter **all** outlet boxes shall be galvanized or sherardized pressed steel boxes. Outlet boxes for surface raceways shall be galvanized steel prime painted boxes

and shall be compatible with the size and type surface raceway used.

- C. All outlet boxes shall be a minimum of 4" square or round by 1 ½" deep unless indicated otherwise on the drawings and unless a local condition requires a small box (metal and glass partition work, etc.). Use deeper boxes where required by the number of wires, splices, bushings, special fixture, wiring devices, and as specified hereinbefore.
- D. Pressed steel boxes and accessories shall be as manufactured by Thomas & Betts, Steel City, or National Electric. Outlet boxes and accessories for surface raceways shall be as manufactured by Panduit, Wiremold, National Electric, Hubble, or other approved.

1.08 PULL AND JUNCTION BOXES

- A. Furnish and install all pull boxes and junction boxes in the various electrical conduit systems where specified, where indicated on the drawings, and wherever required to facilitate the proper installation of the wires and cables.
- B. Junction boxes shall meet all the requirements of and be installed in a manner identical to that specified elsewhere herein for outlet boxes except: 1) that with the exception of junction boxes used for surface raceways, generally all junction boxes shall be installed only in unfinished areas or behind lay-in ceilings where they shall be accessible (whether junction boxes are installed in finished areas or unfinished areas they shall be flush mounted in masonry or non-masonry walls except in machine rooms, equipment rooms, and boiler masonry walls where they may be surface mounted cast boxes or non-metallic boxes as specified for outlet boxes); 2) that minimum size pressed steel junction box shall not be less than 4 11/16" square by 2 1/8" deep. 3) and that all pressed steel junction boxes shall be provided with blank aluminum cover plates having an anodized finish similar to those specified under Wiring Devices (except pressed steel boxes above hung ceilings which shall be provided with flat galvanized or sherardized steel plates). Special junction boxes shall be in accordance with these specifications and as specified elsewhere herein or on the drawings.
- C. Pullboxes shall be constructed of standard type and size code gauge boxes and covers and shall be employed where practical unless specified otherwise. Pullboxes other than standard (for both steel and non-metallic conduit systems) shall be constructed of not less than 12 gauge galvanized sheet steel with suitable angle iron reinforcing frame. Access for surface mounted pullboxes (standard and non-standard) shall be provided by means of removable screw-on covers and sides. Flush type pullboxes shall always be of the non-standard type and shall have single door with trim and lock as specified elsewhere herein for panelboards. Pull boxes shall be sized as indicated on the drawings and/or in accordance with the N.E.C. and shall be phosphate treated and finished as specified elsewhere herein for panelboards. Other pull boxes shall be in accordance with these specifications and as specified elsewhere herein or on the

drawings. Pull boxes shall be as manufactured by Empire, Lexington, Standard, or other approved.

1.09 WIRING DEVICES

- A. Unless noted otherwise elsewhere, herein, or on the drawings, the Division 16 Contractor shall furnish and install all wiring devices. Wiring devices furnished by the Division 16 Contractor shall be as manufactured by Hubbell, Leviton, or Arrow Hart, unless noted otherwise, and shall be of the specification grade and type indicated hereinafter or on the drawings and in compliance with the following specifications:

1. Switches: (Unless otherwise noted on drawings and specifications)

Switches: Hubbell 1221-I
Key Switches: Hubbell 1221L and Key

Switches shall be located at the strike side of doors as finally hung, whether indicated on the drawings or not. All three-way and four-way switches shall have ivory toggles unless otherwise noted on drawings.

2. Standard Receptacles: (Unless otherwise noted on drawings or specifications, provide tamper resistant receptacles as follows):

Duplex Receptacle 20A-125V: Hubbell HBL 5362TR
Ground Fault Interrupter 20A-125V: Hubbell GF 5362TR

3. Key Switches:

Check with building custodian and install keyed units where indicated. Provide a key for each switch and receive a signed receipt for records.

- B. All other incidental wiring devices shall be of the same make and quality of those as specified herein.
- C. Furnish and install cover plates for each switch, receptacle, and other wiring devices being installed unless noted otherwise. Several wiring devices located at the same location shall be installed in ganged type boxes as specified under outlet boxes, and such devices shall be provided with multi-gang cover plates of the types specified hereinafter. All cover plates shall be stainless steel "302" plates and shall have a brushed finish as selected by the Engineer for each particular room or area. Plates shall be .04 thick, of same manufacture and device.

1.10 PANELBOARDS

- A. Furnish and install lighting equipment and power panelboards as indicated on the floor plan and in the schedule on the drawing. Panelboards shall be suitable for 120/208 volts, 3 phase, 4 wire service or 277/480 volts, 3 phase, 4 wire or as may otherwise be specified.

- B. The panelboards shall be of the dead front type mounted in a 12 gauge (minimum) galvanized sheet steel cabinet or enclosure suitable for surface mounting as shown on the drawing. Enclosure shall be equipped with sheet steel trims having hinged doors. Trim shall be provided with angle supports, which engage the flange of the cabinet and shall be fastened to the cabinet by means of approved clamps. The use of screws engaging holes in the flange of the cabinet for fastening trim will not be acceptable. Door shall have concealed hinges and paracentric cylinder lock. Panel shall be finish painted with baked-on gray enamel. On the inside of the panelboard, provide a typewritten numerical directory, in a metal frame having a transparent plastic face. Directory shall indicate service controlled by each circuit, voltage service to panel, and feeder size serving panel.
- C. Ample gutter space shall be provided in accordance with the National Electric Code and these specifications, with minimum gutter space of six inches.
- D. Minimum width of panel including gutter space shall be 20 inches. All lugs for incoming and outgoing terminals shall be of the solderless type. Feeder lugs shall be single or multiple types as required. Where cable lug connections are made directly to the bus bars, they shall be made via cast type lugs manufactured of the proper metal alloys so as not to cause a galvanic reaction when connecting the copper cables to the aluminum bus bars.
- E. Panelboards shall be of the bolt on circuit breaker type. Circuit breakers shall be molded case type and shall be of the individual unit construction complete with quick-make, quick-break mechanism; thermal magnetic trip; ambient compensation and shall be interchangeable in the panelboard assembly in ratings from 15 through to 100 amperes on 120/208 volt panels without necessitating bus, line, or assembly rearrangements. All circuit breakers shall have suitable bolt type line terminals so that they can be held in positive contact with their respective links or bus. **Plug-in breakers shall not be acceptable.** All single pole breakers in panel shall be so arranged and connected to the main bus that any three adjacent breakers are connected to Phase A, B, and C respectively and that same relationship of phase sequence is maintained. All branch circuit breakers shall have the number of poles and circuits as indicated on the drawing and shall be as specified hereinafter. Connect all circuits on all panels so as to balance the load as much as possible on all phases.
- F. Panelboards shall be as specified herein. Provide ten (10) circuit breaker handle lock dogs for Custodian's use (per panel).
- G. All busing shall be of high conductivity silver-plated solid copper. Bus bar carrying capacity shall be at least equal to the capacity of the protective device on the panel feeder. Where feeders are oversized in capacity to compensate for feeder length, the panel shall be equipped with lugs equal to the oversize feeder conductors. Alternately, the feeder may be spliced with compression indent splices to transition from the oversize conductor to the normal size conductor (that matches the

panel bus) in a splice box external to the panel. This technique may also be employed at the originating protective devices.

Shaving of conductors to fit lugs is specifically disallowed.

- H. Panelboards shall be as specified and/or similar to Eaton, Siemens, or G.E. in compliance with these specifications.
- I. Where a flush mounted panel is being provided, the Division 16 Contractor shall check the depth of block walls containing same and shall have the panel fabricated to suit space available.
- J. Provide door-in-door panelboard cover unless otherwise specified.
- K. New circuit breakers installed in existing panelboards shall listed for, and shall match the interrupting rating of the intended panel.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16511 - FIRE STOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in/ joints between fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- A. Only tested fire stop systems shall be used in specific locations as follows:
 - 1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical bus ways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Safing slot gaps between edge of floor slabs and curtain walls.
- C. Openings between structurally separate sections of wall or floors.
- D. Gaps between the top of walls and ceilings or roof assemblies.
- E. Expansion joints in walls and floors.
- F. Openings and penetrations in fire-rated partitions or walls containing fire doors.
- G. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
 - 1. Section 03300 - Cast-In-Place Concrete
 - 2. Section 07900 - Joint Sealers
 - 3. Section 04200 - Masonry Work
 - 4. Section 09200 - Lath and Plaster
 - 5. Section 09250 - Gypsum Drywall Systems
 - 6. Section 13080 - Sound, Vibration and Seismic Control
 - 7. Section 13900 - Fire Suppression and Supervisory Systems

FIRESTOPPING

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8. Section 15050 - Basic Mechanical Materials and Methods
9. Section 15250 - Mechanical Insulation
10. Section 15300 - Fire Protection
11. Section 15400 - Plumbing
12. Section 16100 - Basic Electrical Materials and Methods

1.05 REFERENCES

- A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 1. UL Fire Resistance Directory:
 - a. Fire stop Devices (XHJI)
 - b. Fire Resistance Ratings (BXUV)
 - c. Through-Penetration Fire stop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 2. Alternate "Omega Point Laboratories Directory" (updated annually)
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems" (July 1998.)
- D. Test Requirements: ASTM E 1966-01, "Standard test method for Fire Resistive Joint Systems"
- E. Inspection Requirements: ASTM E 2174 - 01, "Standard Practice for On-site Inspection of Installed Fire Stops."
- F. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- G. ASTM E-84-01, Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. All major building codes: ICBO, SBCCI, BOCA, and IBC.
(Note to specifier: Retain or delete building codes listed above as applicable)
- I. NFPA 101 - Life Safety Code
- J. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

- B. Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time).

1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

- E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
 - 1. Hilti, Inc., Tulsa, Oklahoma (or equal)
800-879-8000

2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type,

annular space requirements, and fire-rating involved for each separate instance.

- B. Cast-in place firestop devices for use with non-combustible and combustibile plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:
 - 1. Hilti CP 680 Cast-In Place Firestop Device
 - a. Add Aerator adaptor when used in conjunction with aerator ("sovent") system.
 - 2. Hilti CP 681 Tub Box Kit for use with tub installations.
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant
 - 2. Hilti CP 604 Self-leveling Firestop Sealant
 - 3. Hilti CP 620 Fire Foam
 - 4. Hilti CP 606 Flexible Firestop Sealant
 - 5. Hilti CP 601s Elastomeric Firestop Sealant
- D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
 - 1. Hilti CP 601s Elastomeric Firestop Sealant
 - 2. Hilti CP 606 Flexible Firestop Sealant
 - 3. Hilti FS-ONE Intumescent Firestop Sealant
- E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
 - 1. Hilti CP 672 Speed Spray
 - 2. Hilti CP 601s Elastomeric Firestop Sealant
 - 3. Hilti CP 606 Flexible Firestop Sealant
 - 4. Hilti CP 604 Self-leveling Firestop Sealant
- F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
 - 1. Hilti CP 677 Speed Plugs
 - 2. Hilti CP 767 Speed Strips
- G. Intumescent sealants, caulking materials for use with combustibile items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant

- H. Foams, intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti FS-ONE Intumescent Fire stop Sealant
 2. Hilti CP 618 Fire stop Putty Stick
 3. Hilti CP 620 Fire Foam
 4. Hilti CP 601s Elastomeric Fire stop Sealant
 5. Hilti CP 606 Flexible Fire stop Sealant
- I. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti CP 618 Fire stop Putty Stick
- J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti CP 617 Fire stop Putty Pad
- K. Fire stop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti CP 642 Fire stop Collar
 2. Hilti CP 643 Fire stop Collar
 3. Hilti CP 645 Wrap Strips
- L. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical bus ways in raceways, the following products are acceptable:
1. Hilti CP 637 Trowelable Fire stop Compound
 2. Hilti FS 657 FIRE BLOCK
 3. Hilti CP 620 Fire Foam
- M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical bus ways in raceways, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
- N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti CP 672 Speed Spray
 2. Hilti CP 601s Elastomeric Fire stop Sealant
 3. Hilti CP 606 Flexible Fire stop Sealant
 4. Hilti CP 604 Self-Leveling Fire stop Sealant

- O. Provide a fire stop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- P. Provide a fire stop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which fire stop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Fire stop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place fire stop devices without interferences.

3.03 INSTALLATION

- A. Regulatory Requirements: Install fire stop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL fire stop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing fire stop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess fire stop materials and soiling as work progresses.

END OF SECTION

DIVISION 16 - ELECTRICAL

SECTION 16720EX - FIRE ALARM SYSTEM - (EXPAND EXISTING SYSTEM)

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:

1. Drawings and general provisions of the Subcontract apply to this Section.
2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes, but not limited to:

1. Conduit and wiring necessary to connect the existing FACP to alarm initiating devices, notification appliances and auxiliary equipment
2. Addressable manual fire alarm stations
3. Addressable analog area smoke detectors
4. Addressable analog duct smoke detectors
5. Addressable analog heat detectors
6. Carbon Monoxide Detectors
7. Connections to sprinkler waterflow alarm switches
8. Connections to sprinkler supervisory switches and tamper switches
9. Audible and visual combination notification appliances
10. Air handling systems shutdown relays
11. Elevator recall/shunt relays (if the building has an elevator)
12. Battery standby

C. Work scope:

1. Work shall include any or all of the following:
 - a. Removal of existing devices no longer required as a result of demolition activities in the project area, as indicated in the Drawings. Demolition work shall include removal of device(s), the removal or surface mounted or exposed backboxes, or the abandonment of recessed backboxes, and removal of any associated wiring, and raceways rendered obsolete by the demolition. It shall also include any programming required to remove such devices from the system. All removed devices shall be turned over to the Owner, unless otherwise noted.
 - b. Removal and re-installation of existing devices and/or associated wiring to accommodate new finish work or equipment replacements by others.
 - c. Re-location of existing devices and/or wiring associated with renovated areas. Work shall include all wiring extensions as per code and manufacturer specifications to serve the device at its new location.
 - d. Addition of new devices, backboxes and wiring to serve new or renovated areas as shown on the drawings. Included in this work shall be all programming required to integrate the new devices into the system.

2. It is the declared intent of this specification that the end result of the system modifications shall be a complete and operational fire alarm system. Provide all required expansion modules, power supplies, batteries, interfaces, programming, inspections, testing, etc. to achieve the result whether or not shown on the drawings.
3. Maintain existing fire alarm devices affected by Project Work for renovated space, including areas affected by asbestos abatement within existing zones. This would require disconnection, reconnection and commissioning of existing devices during installation of new ceiling systems.

1.2 DEFINITIONS

- A. LED: Light-emitting diode.
- B. NICET: National Institute for Certification in Engineering Technologies.

1.3 REFERENCES

- A. General:
 1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
 2. Unless otherwise noted, the edition of the referenced code or standard that is current at the time of the "date of record" for the Work shall be considered the effective code or standard for the duration of the project.
 3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
 4. Refer to specific Division 26 Sections for additional referenced codes and standards:
 - ANSI/NFPA 70 - National Electrical Code.
 - ANSI - American National Standards Institute.
 - ASME A17.1 Safety Code for Elevators and Escalators
 - FM - Factory Mutual System.
 - NFPA - National Fire Protection Association
 - NFPA 72 - National Fire Alarm Code
 - UL - Underwriters' Laboratories:

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
 1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 2. Include battery-size calculations for revised service.

3. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
4. Include revised riser diagram complete with devices labeled with Project room numbers and device address number.
5. Include floor plans to indicate final device locations and showing address of each addressable device. In addition, indicate applicable candela settings and tap settings of each notification device.

C. General Submittal Requirements:

1. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified fire-alarm technician, Level III minimum.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," deliver copies to authorities having jurisdiction and include the following:

1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.

B. Operational Documentation:

1. Program Software Backup: On magnetic media or compact disk, complete with data files.
2. Device address list.
3. Updated O&M Manual.

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. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than 1 unit.
2. Keys and Tools: One extra set for access to locked and tamper-proofed components.
3. Fuses: Two of each type installed in the system.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.8 WARRANTY

- A. Provide and submit written warranty, signed by the manufacturer, agreeing to replace/repair, within the warranty period, all equipment with inadequate and/or defective materials and workmanship, including leakage, breakage, improper assembly or failure to perform as required; provided that the manufacturer's instructions for handling, installing protecting and maintaining units have been adhered to during warranty period. Warranty shall include all component replacement costs, including labor and wring for removal and reinstallation. Such warranty shall be required of the installing contractor even if in excess of original manufacturer warranties.

- 1. Warranty period: One (1) year, beginning upon completion of equipment installation and commissioning.

1.9 PROJECT CONDITIONS

- A. The existing fire alarm system shall remain in service throughout the project, except as described below.
- B. Interruptions of Existing Fire Alarm service: Coordinate any required shutdowns with Owner to tie in new fire alarm devices. Outages shall only be scheduled during off hours, weekends, holidays etc. when the building is not in use. Include all premium time on bid. Provide any required fire watches.
 - 1. Notify Architect, Construction Manager, Owner no fewer than two-days in advance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work. The manufacturer's equipment must be listed for use and function with the existing FACP.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices as applicable to the facility:
 - 1. Manual stations.
 - 2. Smoke detectors.
 - 3. Duct smoke detectors.
 - 4. Heat Detectors.
 - 5. Beam Detectors.
 - 6. Fire suppression system operation
 - 7. Automatic sprinkler system waterflow device activation.
- B. Fire-alarm signal shall initiate the following actions as applicable to the facility. Any operation sent out from the main FACP shall remain as is prior to this project.:
 - 1. Continuously operate alarm notification appliances.
 - 2. Identify alarm at fire-alarm control unit and remote annunciators.
 - 3. Send alarm signal to central monitoring station
 - 4. Release fire and smoke doors held open by magnetic door holders.
 - 5. Shutdown of fans rated 1000cfm or greater.
 - 6. Close smoke dampers in HVAC duct systems.
 - 7. Recall elevator(s) to primary or alternate recall floors.
- C. System trouble signal initiation shall be by one or more of the following devices and actions:
 - 1. Open circuits, shorts, and grounds in designated circuits.
 - 2. Loss of primary power at fire-alarm control unit.
 - 3. Ground or a single break in fire-alarm control unit internal circuits.
 - 4. Abnormal ac voltage at fire-alarm control unit.
 - 5. Break in standby battery circuitry.
 - 6. Failure of battery charging.
 - 7. Abnormal position of any switch at fire-alarm control unit.
 - 8. Activation of any Carbon Monoxide Detector.
- D. System Trouble and Supervisory Signal Actions: Any operation sent out from the main FACP shall remain as is prior to this project.
 - 1. Annunciate at fire-alarm control unit and remote annunciators. Send trouble / supervisory signal to central monitoring station.
 - 2. For carbon monoxide detector activation - in addition to above, activate local sounder base of the affected device.

2.3 FIRE-ALARM CONTROL UNIT - EXISTING

- A. The existing FACP is as shown on the drawings.
- B. Circuits:
 - 1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.
 - a. Initiating Device Circuits: Style B.
 - b. Notification Appliance Circuits: Style Y.
 - c. Signaling Line Circuits: Style 4.
 - d. Install no more than 80% addressable devices on each signaling line circuit.
 - 2. Serial Interfaces: Two RS-232 ports for printers.
- C. Notification Appliance Circuit: Operation shall remain as is prior to this project. Operation shall sound in a temporal pattern. All visual notification devices shall be synchronized. Provide NAC Extenders as required.
- D. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.
- E. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory.
- F. Transmission to Remote Alarm Receiving Station: Maintain existing automatic transmission of alarm, supervisory, and trouble signals to a remote alarm station.
- G. Primary Power: Existing primary power shall remain as is, unless otherwise indicated.
- H. Secondary Power: Provide battery calculations to verify if the existing batteries are adequate to meet code requirements after system expansion.

2.4 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Double-action mechanism requiring two actions to initiate an alarm; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 2. Station Reset: Key-operated switch.

3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Unless otherwise noted lifting covers shall be non-alarmed. Where alarmed covers are called for, lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation. Provide STI Stopper II or equal.
4. Design Make: Compatible with and listed for use on the existing system.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall match and be of the same manufacturer as the existing smoke detectors on the system.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
 - a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F per minute.
 - b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F.
 - c. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
3. Each sensor shall have multiple levels of detection sensitivity.
4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
5. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.
6. Each duct sensor shall have a Remote Test Station with an alarm LED and test switch.

2.6 HEAT DETECTORS

- A. General Requirements for Heat Detectors: Comply with UL 521.
 1. Temperature sensors shall test for and communicate the sensitivity range of the device.
- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.
 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F.
 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.7 CARBON MONOXIDE DETECTORS

- A. Listed to UL 2075 for Gas and Vapor Detectors and Sensors
- B. The detector shall be equipped with sounder base and trouble relay. The detector base shall be able to mount to a single gang electrical box or direct mount to wall or ceiling.
- C. The detector shall provide dual color LED indication which blinks normal, alarm or end-of-life. When sensor supervision is in trouble or end-of-life condition, the detector shall send a trouble signal to the

panel. In alarm mode the red LED shall blink in a Temporal 4 pattern and the sounder will sound in in a Temporal 4 pattern.

- D. The detector shall provide a means to test CO entry into the CO sensing cell.
- E. Operating voltage shall be 12/24 VDC.

2.8 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections. Where used on an existing system containing addressed notification devices, any new devices shall likewise be addressable as well.

- 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
- 2. Wall mounted notification appliances shall be red color with white lettering. Ceiling mounted notification appliances shall be white color with red lettering.

- B. Horns/Strobe: Unless otherwise required for compatibility with the existing system: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol. Match existing system devices

- C. Visible Notification Appliances: Unless otherwise required for compatibility with the existing system: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.

- 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
- 2. Mounting: Wall mounted unless otherwise indicated.
- 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
- 4. Flashing shall be in a temporal pattern, synchronized with other units.
- 5. Strobe Leads: Factory connected to screw terminals.
- 6. Mounting Faceplate: Factory finished, red.
- 7. Match existing system devices.

2.9 MAGNETIC DOOR HOLDERS

- A. Magnetic door holders shall be UL Listed, flush or surface mounted in a single gang box, aluminum color.

- B. Magnetic door holders shall be low voltage, AC or DC and compatible with the existing fire alarm system.
- C. Magnetic door holders shall have a holding force of 25lbf and shall hold the door open while energized. Doors shall be released upon power failure, or de-energized by means or fire alarm-controlled relay or other switch.
- D. Provide with all required hardware for complete operation - including adjustable contact plates etc.

2.10 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- B. Supervised IAM: Match existing system device, or provide compatible device listed for use on the system.

2.11 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, notification device, or other device requiring protection.
- B. Factory fabricated and furnished by device manufacturer.
- C. Finish: Paint of color to match the protected device.
- D. Provide device guards to devices installed in areas subject to physical damage. This shall include, but not limited to, Gymnasiums, Wrestling Rooms, Weight Rooms, Locker Rooms, Shops, Receiving / Loading Areas, Exterior devices.

2.12 FIRE ALARM WIRE AND CABLE

- A. Fire Alarm circuits: Install cables in metal J hooks above accessible ceilings and in Wiremold 500 exposed in finished spaces
- B. Manufacturers: Subject to fire alarm system manufacturer's requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Comtran Corp.
 2. Genesis Cable Products; Honeywell International, Inc.
 3. West Penn Wire/CDT; a division of Cable Design Technologies.
 4. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
- C. Signaling Line Circuits: Twisted, shielded pair, not less than No . 18 AWG size as recommended by system manufacturer.
- D. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2- hour rating.

- E. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.
 - 3. Multi-conductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

PART 3 - EXECUTION

3.1 FIELD CONDITIONS

- A. Prior to installation carefully inspect the installed work of other trades, whether pre-existing or part of this project and verify that such work is complete to the point where the installation of the fire alarm system may properly commence

3.2 EQUIPMENT INSTALLATION

A. General:

- 1. Comply with NEC, NFPA 72 and manufacturer requirements or installation of fire-alarm equipment.
 - 2. Follow Division 16 Section "Common Work Results for Electrical", for anchorage requirements.
 - 3. Verify dimensions in the field. Lay out work in the most direct and expeditious manner to avoid interference.
 - 4. Coordinate necessary shutdowns of existing systems by notifying the Construction Manager or Owner's Representative a minimum of 10 working days before rendering such systems inoperative. Do not render inoperative any system without the prior approval.
 - 5. Coordinate fire alarm detectors and associated equipment with existing ceiling or roof materials, lighting, ductwork, conduit, piping, suspended equipment, structural and other building components.
 - 6. Coordinate installation of fire alarm system with work of other trades. Protect fire alarm equipment with suitable coverings until completion of Project and remove prior to system turnover.
 - 7. Install initiating devices, control panels, audible signals, connections to equipment provided under other divisions, and related work following equipment manufacturers' requirements for a complete and properly functioning system that will perform specified functions.
- B. Install wall-mounted equipment, with tops of cabinets not more than 72 inches above the finished floor.

- C. Devices and raceways installed in new walls or existing stud walls shall be flush mounted with concealed wiring. Devices installed on existing block wall construction shall be surface mounted.
- D. Smoke-Detector Spacing:
 - 1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 - 2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing
 - 3. Smooth ceiling spacing shall not exceed 30 feet. Greater spacing in corridors in accordance with NFPA 72 is permitted.
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
 - 5. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
 - 6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.
- E. Duct Smoke Detectors: Comply with NFPA 72. Install sampling tubes so they extend the full width of duct.
- F. Visible Alarm-Indicating Devices: Install with lens at no less than 80" and not more than 96" above finished floor or on the ceiling as indicated. Install all devices at the same height unless otherwise indicated.
- G. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

- A. Pathways above recessed ceilings and in non-accessible locations may be routed exposed.
- B. Exposed pathways located in finished areas shall be installed in surface metal raceway and in EMT in storage, mechanical and utility spaces.
- C. Exposed EMT shall be painted to match adjacent areas.
- D. Exposed box covers in non-public areas shall be painted red.

3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions.
 - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation

connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated air-conditioning duct systems.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals.

3.6 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction (AHJ).

- B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

- C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

- a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.

- b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.

4. Test audible appliances for the private operating mode according to manufacturer's written instructions.

5. Test visible appliances for the public operating mode according to manufacturer's written instructions.

6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

- D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION