Project Manual

For construction contracts greater than $20,000

Café Addition and Renovation
SU-031918
February 16, 2018

State University of New York Purchase College
735 Anderson Hill Road
Purchase, New York 10577-1402
Eugene Harris, Economic Project Solutions, Inc.

Project Number: SU-031918 Date: February 16, 2018
Project Name: Café Addition and Renovation
Agency/Div Code: _____ Contract No.: _____

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State University of New York Construction Agreement

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5. Affirmative Action and Minority & Women Owned Business Enterprises *from SUNY Procedure Item #7557 "Participation by Minority Group Members and Women (MWBEs) with Respect to State University of New York Contract" (applies >$100,000)*
   a. Form 7557-121b – MWBE Prospective Bidders Notice
   b. Form 7557-107 - M/WBE Utilization Plan *(required within seven days of the bid)*
   c. The Contractor's EEO Policy Statement or Form 7557-104 *(required within seven days of the bid)*
   d. Form 7557-108 - M/WBE-EEO Work Plan *(required within seven days of the bid)*

   Note: In accordance Procedure Item #7557 MWBE Utilization Plans, EEO policy statements and EEO Work Plans are due within seven days of submittal of the bid.

6. Service Disabled Owned Business Enterprise *from SUNY Procedure Item #7564 "Participation by Service-Disabled Veteran-Owned Business (SDVOBs) with Respect to State University of New York Contracts" (applies >$100,000)*
   a. Form 7564-121b – SDVOB Prospective Bidders Notice
   b. Form 7564-107 - SDVOB Utilization Plan *(required with the bid)*

Attachments –Additional Contractor Documentation (required after bid opening from the low bidder)

7. State Finance Law §§139-j and 139-k *from SUNY Procedure Item #7552 "Procurement Lobbying Procedure for State University of New York" (applies >$15,000)*
   a. Form A - Summary: Policy and Procedure of the State University of New York Relating to State Finance Law §§139-j and 139-k
   b. Form B - Affirmation with respect to State Finance Law §§139-j and 139-k
   c. Form C - Disclosure and Certification with respect to State Finance Law §§139-j and 139-k

8. Procurement Forms *from SUNY Procedure Item #7553 "Purchasing and Contracting (Procurement)*
   - Form I Omnibus Procurement Act of 1992 *(applies >$1,000,000)*
   - Form II Omnibus Procurement Act of 1992, Out of state firms *(applies >$1,000,000)*
   - Form XIII Public Officers Law Compliance

9. Bonds and Certificate of Insurance *from SUNY Procedure Item #7554 "Construction Contracting Procedures*
   a. Form 7554-11 Labor & Materials and Performance Bonds *(applies >$50,000)*
   b. Form 7554-12 Certificate of Insurance *(applies to all contracts)*
   c. NYS Workers Compensation and Disability Insurance *(applies all contracts)*

10. Vendor Responsibility
    a. OSC's Vendrep - Online System or Link to paper forms *(form applies ≥ $100,000)*

11. NYS Labor Law, Section 220-a
    a. Form 7554-13

i. Form AC 2947, Prime Contractor's Certification
ii. Form AC 2948, Subcontractor's Certification
iii. Form AC 2958, Sub-subcontractor's Certification

Notice to Bidders and Newspaper Advertisement

Notice to Bidders

The State University of New York **Purchase College** will receive sealed bids for project number **SU-031918** titled **Café Addition and Renovation** until 1:00 p.m. local time on **April 18th, 2018** at the Purchasing and Accounts Payable Office, Campus Center South building, Purchase College, 735 Anderson Hill Road, Purchase New York 10577-1402, where such proposals will be publicly opened and read aloud. Proposals may be hand delivered or mailed to the above location and must be received by such time.

All work on this Contract is to be completed within **(89)** calendar days, starting ten (10) calendar days after the contract approval date.

A Pre-Bid Conference and site walk-through for prospective Bidders will be held at **11:00AM** on **April 5th, 2018** at the **Campus Center North building (The Hub / Food Court)** at Purchase College, 735 Anderson Hill Road, Purchase New York 10577-1402. Please note: This will be the only guided walk-through of the subject project facilities.

For directions to Purchase College, see
https://www.purchase.edu/admissions/travel-and-transportation/#Directions

For a campus map, see
https://www.purchase.edu/live/files/220-campus-map

Purchase College is dedicated to environmentally sustainable practices and development. In an effort to conserve resources and reduce waste, the Bidding and Contract Documents will only be available electronically in PDF format for viewing and downloading at the following website:
https://www.purchase.edu/PurchaseMeansBusiness

There will be a Question Period from **Mar 20 – Apr 10th, 2018**. During this time any questions must be submitted in writing (no telephone calls) to the following email address . The email should reference the project in the subject line and include prospective bidder contact information and email address eharris@economicprojects.com . A response to all questions submitted within the Question Period and any additional Addenda will be posted no later than the close of business on **April 12th, 2018** to https://www.purchase.edu/PurchaseMeansBusiness

Bids must be submitted in duplicate in accordance with the instructions contained in the Information for Bidders. Security will be required for each bid in an amount not less than five (5) percent of the Total Bid.

It is the policy of the State of New York and the State University of New York to encourage minority business enterprise participation in this project by contractors, subcontractors and suppliers, and all bidders are expected to cooperate in implementing this policy. The minority (MBE) and women (WBE) owned business contractor/subcontractor participation goals for this construction procurement are tentatively set at **15%** for MBEs and **15%** for WBEs. The service

disabled veteran owned business (SDVOB) subcontractor participation goal is tentatively set at **6%**. The MBE, WBE and SDVOB goals are subject to revision.

The rates of wages and supplements determined by the Industrial Commissioner of the State of New York as prevailing in the locality of the site at which the work will be performed can be found at:
https://applications.labor.ny.gov/wpp/publicViewProject.do?method=showIt&id=1448673

The Prevailing Rate Case (PRC) Number assigned to this project is **2018003056** .

Pursuant to State Finance Law §§139-j and 139-k, this solicitation includes and imposes certain restrictions on communications between Purchase College and an Offeror/Bidder during the procurement process. An Offeror/Bidder is restricted from making contacts from the earliest notice of intent to solicit proposals through final award and approval of the Procurement Contract by Purchase College/State University of New York and, if applicable, the Office of the State Comptroller ("restricted period") to other than designated staff unless it is a contact that is included among certain statutory exceptions set forth in State Finance Law §139-j(3)(a). Pursuant to the statute, Purchase College employees are also required to obtain certain information when contacted during the restricted period and maintain a record of the communication, and make a determination of a knowing and willful contact. Contact made to other than designated staff regarding this procurement may disqualify the vendor from the current award and affect future procurements with government entities in the State of New York.

The State University of New York reserves the right to reject any or all bids.

Designated Contacts:

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Newspaper Advertisement

NOTICE TO BIDDERS: Purchase College, State University of New York will receive sealed Proposals for **Project SU-031918**, Titled **"Café Addition and Renovation"** until **1:00 P.M. Local Time on April 18, 2018**, at the Purchasing & Accounts Payable Office, Campus Center South building, Purchase College, State University of New York, 735 Anderson Hill Road, Purchase, New York 10577-1402, when they will be opened publicly and read.

A non-mandatory Pre-Bid Conference and site walk-through for prospective Bidders will be held at **11:00AM** on **April 5th, 2018** at the Campus Center North building (The Hub / Food Court) at Purchase College, 735 Anderson Hill Road, Purchase New York 10577-1402. Please note: This will be the only guided walk-through of the subject project facilities.

For directions to Purchase College and for a campus map, see:
https://www.purchase.edu/admissions/travel-and-transportation/

The Bidding and Contract Documents are available at the following website: https://www.purchase.edu/purchasemeansbusiness . Telephone/fax requests will not be considered.

Submitted by:
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INFORMATION FOR BIDDERS

Section 1 Definitions

All definitions set forth in the Agreement are applicable to the Notice to Bidders, Information for Bidders and the Proposal, all of which documents are hereinafter referred to as the Bidding Documents.

Section 2 Issuance of Bidding and Contract Documents

(1) Purchase College is dedicated to environmentally sustainable development. In an effort to conserve resources and reduce waste, the Bidding and Contract Documents will only be available electronically in PDF format for viewing and downloading at the following website: https://www.purchase.edu/purchasemeansbusiness

Section 3 Proposals

(1) Proposals must be submitted in duplicate on the forms provided by the University. They shall be addressed to the University in a sealed envelope, marked with the name and address of the bidder, the title of the Project and the Project number. The University accepts no responsibility for Proposals that may be delivered by any courier or other messenger service that does not contain all of the above-noted information on the outside of a sealed envelope. Facsimile or email copies of the Proposal will not be accepted.

Sealed Proposals are to be delivered to:

F. Edward Herran
Interim Director of Procurement & Accounts Payable
Purchase College
State University of New York
735 Anderson Hill Road
Purchase, NY 10577-1402

Proposals must be received in the Purchasing & Accounts Payable Office by the due date and time. Bidders mailing their Proposals must allow sufficient time to ensure receipt of their Proposals by the date and time specified. Bidders are cautioned that, although using a trackable mailing/courier/messenger service, bids must be received in the Purchasing & Accounts Payable Office by the due date and time. Although bids may be signed for by Purchase College Mail Operations personnel prior to bid opening time on the day of the bid, this does not guarantee that the Purchasing & Accounts Payable Office will receive the bid by bid opening time. No bid will be considered that is not physically received in the Purchase College Purchasing & Accounts Payable Office by the bid opening time.

(2) All blank spaces in the Proposal must be filled in and, except as otherwise expressly provided in the Bidding Documents; no change is to be made in the phraseology of the Proposal or in the items mentioned therein.

(3) Proposals that are illegible or that contains omissions, alterations, additions or items not called for in the Bidding Documents may be rejected as informal. In the event any bidder modifies, limits or restricts all or any part of its Proposal in a manner other than that expressly provided for in the Bidding Documents, its Proposal may be rejected as informal.

(4) Any Proposal may be considered informal which does not contain prices in words and figures in all of the spaces provided or which is not accompanied by a bid security in proper form. In case any price shown in words and its equivalent shown in figures do not agree, the written words shall be binding upon the bidder. In case of a discrepancy in the prices contained in the Proposal forms submitted in duplicate by the bidder, the Proposal form which contains the lower bid shall be deemed the bid of the bidder; provided, however, the University at its election may consider the Proposal of such bidder informal.

(5) If the Proposal is made by a corporation, the names and places of residence of the president, secretary and treasurer shall be given. If by a partnership, the names and places of residence of the partners shall be given. If by a joint venture, the names and addresses of the members of the joint venture shall be given. If by an individual, the name and place of residence shall be given.

(6) No Proposal will be considered which has not been deposited with the University at the location designated in and prior to the time of opening of bids designated in the Bidding and Contract Documents or prior to the time of opening as extended by Addendum.

(7) Bids may be modified, withdrawn or canceled only in writing or by email notice received by the University prior to the time of opening of bids designated in the Bidding and Contract Documents. A written or email notice of modification, withdrawal or cancellation shall be marked by the bidder with the name and address of the bidder, the title of the Project and the Project number. Upon receipt by the University a duly authorized employee of the University, who shall note thereon the date and time of receipt and shall thereupon attach said written or email notice of modification, withdrawal or cancellation to the envelope submitted by the bidder pursuant to subdivision (1) of this

(8) Permission will not be given to modify, explain, withdraw or cancel any Proposal or part thereof after the time designated in the Bidding and Contract Documents for the opening of bids, unless such modification, explanation, withdrawal or cancellation is permitted by law and the University is of the opinion that it is in the public interest to permit the same.

Section 4 Examination of Bidding and Contract Documents

(1) Prospective bidders shall examine the Bidding and Contract Documents carefully and, before bidding, shall make written request to the Consultant (with a copy thereof to the University) for an interpretation or correction of any ambiguity, inconsistency or error therein which should be discovered by a reasonably prudent bidder. Such interpretation or correction as well as any additional Contract provision the University shall decide to include will be issued in writing by the Consultant as an Addendum, which will be sent to each person recorded as having received a copy of the Bidding and Contract Documents from the Consultant, and which also will be available at the places where the Bidding and Contract Documents are available for inspection by prospective bidders. Upon such emailing or delivery and making available for inspection, such Addendum will become a part of the Bidding and Contract Documents and will be binding on all bidders whether or not the bidder receives or acknowledges the actual notice of it. Prospective bidders are responsible for ensuring that all addenda have been incorporated into the bid. The requirements contained in all Bidding and Contract Documents shall apply to all Addenda.

(2) Only the written interpretation or correction so given by Addendum shall be binding. Prospective bidders are warned that no trustee, officer, agent or employee of the University or the Consultant is authorized to explain or interpret the Bidding and Contract Documents by any other method, and

any such explanation or interpretation, if given, must not be relied upon.

Section 5 Computation of Bid

(1) In computing their bids, bidders are not to include the sales and compensating use taxes of the State of New York or of any city and county in the State of New York for any supplies or materials which are incorporated into the completed Project as the University is exempt from such taxes.

(2) Unit prices may be inserted in the Proposal by the University or the bidder at the discretion of the University. Any unit prices listed in the Proposal by the University are based upon the Consultant's appraisal of a fair cost for the work involved. Such listed prices will be binding upon both the bidder and the University unless the bidder wishes to change any of such unit prices by crossing out the listed unit price and inserting a revised unit price. Such revised unit price shall not be binding upon the University unless it accepts the same, in writing, before it issues a Notice of Award. In the event the Proposal contains blank spaces for unit prices or the bidder revises any stated unit price, the amount of such unit prices for additions shall not vary by more than 15 percent from the prices inserted by the bidder for deductions, and, if the variance of such prices exceeds 15 percent, the University may adjust the deduction price inserted by the bidder so that it is only 15 percent lower than the addition price inserted by the bidder. In addition, the University may adjust any unit price filled in by a bidder to an amount agreeable to both the bidder and the University or it may reject any unit prices.

(3) Alternates, if any, listed in the Proposal shall be accepted in the order indicated and will be used in combination with the Base Bid to determine the low bidder. Unit prices will not be used to determine the low bidder.

(4) If a tie bid should occur the University reserves the right to use one of the following methods to determine the successful bidder. For tie bids between two contractors the University representative shall flip a coin, both affected contractors must be present for the coin toss. For tie bids between three or more contractors the University representative shall pull names from a bowl, hat or other container. The affected contractors must be present for the drawing.

Section 6 Payment of Bid Security

(1) Each Proposal must be accompanied by the required amount of the bid security, which is 5% or the full and just sum of the difference between the Principal and the Total Bid of the bidders submitting the next lowest bid, whichever sum is higher, in the form of a bank draft or certified check, payable at sight to the University and drawn on a bank authorized to do business in the United States, or by a Bid Bond, on a form approved by the University, duly executed by the bidder as principal and having as surety thereon a surety company or companies, approved by the University, authorized to do business in the State of New York as a surety. Attorneys-in-fact who execute a Bid Bond on behalf of a surety must affix thereto a certified and effectively dated copy of their power of attorney.

(2) The University will return, without interest, bid securities in accordance with the following procedure:

a. To all bidders except the apparent three (3) lowest bidders within two (2) working days after the opening of bids.

b. To any bidder submitting a Bid Bond as a replacement for a previously provided bank draft or certified check, within two (2) working days after the University's approval of such Bid

Bond.

c. To the apparent three (3) lowest bidders, unless their bid security was previously returned, within two (2) working days after delivery to the University by the successful bidder of the executed Agreement and required Bonds, or within two (2) working days of the University's rejection of all bids or within two (2) working days after the expiration of forty-five (45) calendar days after the bid opening, whichever event shall occur first.

d. Bid Bonds, due to their nature, will not be returned.

(3) The University reserves the right to deposit bid security drafts or checks pending final disposal of them.

Section 7 Qualifications of Bidders

(1) A bidder must demonstrate, to the satisfaction of the University, that it has successfully completed three (3) contracts similar in size, scope and complexity to this contract within the last five (5) years.

a. For scope and complexity, similar work is defined as General construction that includes **site preparation, concrete, masonry, structural steel, carpentry, caulking/sealants, roofing, flashing/downspouts, glass doors/storefront, drywall, ceilings, flooring, painting, plumbing, fire sprinklers, HVAC, fire alarm system, electrical/data/CATV** work, as further described in the General Requirements, Description of Work.

b. The determination of relevant contract experience in terms of size, scope and complexity will be at the sole discretion of the University.

c. The above three projects shall be submitted on Attachment A of the Proposal (Form 7554-07), “List of Completed Similar Construction Projects” (the List). If the List is not provided or is missing information, and/or is found to have erroneous information or information that is no longer current, a Proposal may be rejected as not responsive. If requested by the University, the bidder may be permitted to add missing information, modify and/or explain erroneous information or information that is no longer current on the List. Modifications and/or explanations of the List must be received within 48 hours of receipt of the University’s request.

(2) All prospective bidders must demonstrate to the satisfaction of the University that they have the skill and experience, as well as the necessary facilities, ample financial resources, ability to manage staff and subcontractors effectively, ability to anticipate and plan construction work for optimal progress, ability to create, strive for and maintain working environments and relationships that are constructive, communicative and cooperative, organization and general reliability to do the work to be performed under the provisions of the Contract in a satisfactory manner and within the time specified.

(3) Each bidder must demonstrate to the satisfaction of the University that it has working capital available for the Project upon which it is bidding in an amount equal to 15 percent of the first $100,000 of the amount of its Base Bid plus 10 percent of the next $900,000 plus 5 percent of the remainder of its Base Bid. Working capital is defined as the excess of current assets over current liabilities. The University defines current assets as assets which can be reasonably expected to be converted into cash within a year, and current liabilities as debts which will have to be paid within

a year.

(4). The University may make such investigation as the University deems necessary to determine the ability of any bidder to perform the Work. Bidders shall furnish to the University all information and data required by the University, including complete financial data, within the time and in the form and manner required by the University. The University reserves the right to reject any bid if the evidence submitted by or an investigation of such bidder fails to satisfy the University that such bidder is properly qualified to carry out its obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.

(5) At the time of the bid opening, all bidders and subcontractors, domestic and foreign, must be in compliance with New York State business registration requirements. Contact the NYS Department of State regarding compliance.

Section 8 Submission of Post-Bid Information

(1) Within forty-eight (48) hours after the opening of bids, each of the apparent three lowest bidders, unless otherwise directed by the University or otherwise provided in the Bidding and Contract Documents, shall submit to both the University and the Consultant:

a. Evidence of a completed New York State Uniform Contracting Questionnaire (Vendor Responsibility Questionnaire For-Profit Construction (CCA-2)). Either email confirmation that the bidder's CCA-2 is current and certified in the New York State VendRep System (VendRep) within the last six months from the bid date, or deliver a certified paper format CCA-2, including all attachments, to the University.

The University recommends that vendors file the required CCA-2 online via the VendRep. To enroll in and use the VendRep, see the VendRep Instructions at http://www.osc.state.ny.us/vendrep/vendor_index.htm or go directly to the VendRep online at https://portal.osc.state.ny.us. To request assistance, contact the Office of the State Comptroller's ("OSC") Help Desk at 866-370-4672 or 518- 408-4672 or by email at ciohelpdesk@osc.state.ny.us.

The paper format CCA-2 and accompanying definitions are available on the OSC website at the following location:

http://www.osc.state.ny.us/vendrep/forms_vendor.htm

b. A working plan and schedule showing clearly, in sequence and time-scale, all significant activities of the work. The working plan and schedule shall be in the form of suitable charts, diagrams or bar graphs and shall be based on the Contractor's logic and time estimates for the anticipated time of commencement and completion of the work and its significant phases and activities and the interrelationship between such significant activities and other items pertinent to the work. This requirement is in addition to and not a substitute for the schedule requirements of section 3.02 (Time Progress Schedule) of the Agreement. Although the working plan and schedule submitted shall not be used in determining the lowest responsible bidder, failure to submit the working plan and schedule may result in the rejection of the Proposal as not responsive.

c. The names and addresses of the bidder's proposed subcontractor for the Asbestos Abatement work of any value, and proposed subcontractors for Electrical Work, the

Heating, Ventilating and Air-Conditioning Work and the Plumbing Work for each of said work categories valued at $100,000 or more.

i. For each proposed subcontractor named, provide a completed "List of Completed Similar Construction Projects (the List)." If the List is not provided or is missing information, and/or is found to have erroneous information or information that is no longer current, a proposed subcontractor may be rejected. If requested by the University, the bidder may be permitted to add missing information, modify and/or explain erroneous information or information that is no longer current on the List; modifications and/or explanations of the List must be received promptly after receipt of the University's request.

ii. Only one proposed subcontractor should be named for each of such trades. Proposed subcontractors of the bidder may not be changed except with the specific written approval of the University**.**

iii. The naming of the bidder itself for any of such work is not acceptable and may result in rejection of the bidder unless the bidder can demonstrate to the University that it has successfully completed or substantially completed three (3) contracts similar in size, scope and complexity for the designated work within the last five (5) years. The determination of relevant contract experience in terms of size, scope and complexity will be at the sole discretion of the University.

iv. The bidder will be required to establish, to the satisfaction of the Consultant and the University, the reliability and responsibility of each of their said proposed subcontractors to furnish and perform the work described in the sections of the Specifications pertaining to each of such proposed subcontractors' respective trades. By submission of the "List of Completed Similar Construction Projects," a proposed subcontractor must be able to demonstrate that they have successfully completed or substantially completed three (3) contracts similar in size, scope and complexity for the designated work within the last five (5) years. The determination of relevant contract experience in terms of size, scope and complexity will be at the sole discretion of the University.

v. For each of the proposed subcontractors, the bidders must submit to the University, within seven (7) calendar days after the bid opening, evidence of a completed New York State Uniform Contracting Questionnaire (Vendor Responsibility Questionnaire For-Profit Construction (CCA-2)). Either email confirmation that the subcontractor's CCA-2 is current and certified in the New York State VendRep System (VendRep) within the last six months from the bid date, or deliver a certified paper format CCA-2, including all attachments, to the University.

vi. In the event that the University and the Consultant reject any of said proposed subcontractors, the bidder, within two (2) working days after receipt of notification of such rejection, shall again submit to the University and the Consultant the name of another proposed subcontractor in place of the one rejected and it will be required to establish to the satisfaction of the University and the Consultant the reliability and responsibility of said proposed subcontractor; When naming another proposed subcontractor, the bidder must promptly submit the proposed subcontractor's completed "List of Completed Similar Construction Projects" and their completed CCA-2.

vii. The bidder will not be permitted to submit another proposed subcontractor if it designated itself for any of the aforesaid categories of work.

viii. Proposed subcontractors of the bidder, approved by the University and the Consultant, must be used on the work for which they were proposed and approved and they may not be changed except with the specific written approval of the University.

d. A breakdown of the amount of the bidder's Proposal. Such breakdown shall be prepared in accordance with industry standards. No bidder shall be barred from revising, in the Contract breakdown required under the provisions of Section 4.08 of the Agreement, the various amounts listed in the bid breakdown required under the provisions of this Section. The amount set forth in said bid breakdown will not be considered as fixing the basis for additions to or deductions from the Contract consideration.

(2) Except for Contracts of $100,000 or less, within seven (7) calendar days after the opening of bids, unless otherwise directed by the University, the three low bidders shall submit to the University for its approval, a Minority and Women-owned Business Enterprise Utilization Plan (Form 7557-107).

(3) Except for contracts of $100,000 or less, within seven (7) calendar days after the opening of bids, the three low bidders shall submit to the University for its approval, an Equal Employment Opportunity Statement and EEO Plan (Form 7557-105) to ensure equal employment opportunities without discrimination because of race, creed, color, sex or national origin. Such Statement and plan should demonstrate the bidder's intent to comply with the provisions of Article VI of the Agreement. The EEO plan should include the methods that the bidder will use to address nondiscrimination and affirmative action so that minorities and women will be included in the work force. The Equal Employment Opportunity ("EEO") Policy Statement that shall contain, but not necessarily be limited to, a provision that the bidder, as a precondition to entering into a valid and binding Contract with the University, shall during the performance of the Contract, agree to the following:

a. It will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability or marital status, will undertake or continue existing programs of affirmative action to ensure that minority group membership and women are afforded equal employment opportunities without discrimination, and shall make and document its conscientious and active efforts to employ and utilize minority group members and women in its work force on the Contract.

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

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

d. After the award of the contract, it shall submit to the University a work force utilization

report, in a form and manner required by the University, of the work force actually utilized on the Contract, broken down by specified ethnic background, gender and Federal occupational categories or other appropriate categories specified by the University.

(4) The above information and such other information as the University or the Consultant may request or obtain will be used by the University in determining the reliability and responsibility of the bidder and any proposed subcontractors. Each bidder must comply promptly with all requests by the University and the Consultant for information and must actively cooperate with the University and the Consultant in their efforts to determine the qualifications of the bidder and any proposed subcontractors. Failure to comply with the latter may result in the rejection of the Proposal as not responsive. All information required to be furnished to the University under this Section shall be sent to the State University at {insert address or email address}.

Section 9 Award of Contract

(1) The award of the Contract shall be made to the bidder submitting the lowest bid that is responsive to the solicitation and who, in the sole opinion of the University, is qualified to perform the work. The University shall determine the lowest bid by adding to or deducting from the Base Bid of the bidders the additive or deductive alternates, if any, the University elects to accept after the opening of the Proposals. Alternates will be accepted in the order they are set forth in the Proposal. The unit prices set forth in the Proposal for additions to or deductions from the work shall not be considered in determining the lowest bid.

The lowest base bid shall not exceed the amount of funds then estimated by the University as available to finance the contract. If the lowest bidder exceeds such amount, the University may reject all bids, or may award the contract on the base bid combined with deductive alternates applied in the order they are set forth in the Proposal as produces the net amount which is within the available funds.

(2) The right is reserved, if, in the University's judgment, the public interest will be promoted thereby, to reject any or all Proposals, to waive any informality in any Proposal received or to afford any bidder an opportunity to remedy any deficiency resulting from a minor informality or irregularity. Without limiting the generality of the foregoing:

a. A Proposal may be rejected as not responsive if the bidder fails to furnish the required bid security or to submit the data required with or after its Proposal and this Information for Bidders.

b. A Proposal may be rejected as not responsive if the bidder cannot show to the satisfaction of the University: (i) that it has the necessary qualifications and capital; or (ii) that it owns, controls or can procure the necessary plant and equipment to commence the work at the time prescribed in the Contract and thereafter to prosecute and complete the work at the rate, or within the time specified; or (iii) that it is not already obligated by the performance of so much other work as is likely to delay the commencement, prosecution or completion of the work contemplated by the Contract.

c. A Proposal will be rejected as not responsive if it does not provide for the completion of the work by the date of completion specified in the Proposal.

(3) The University also expressly reserves the right to reject any Proposal as not responsive if, in its opinion, considering the work to be performed, the facts, as to the bidder's business or technical

organization, plant, financial and other sources of business experience compared with the work bid upon, justify rejection.

(4) The award of the Contract shall not be construed as a guarantee by the University that the plant, equipment and the general scheme of operations and other data submitted by the bidder with or after its Proposal is either adequate or suitable for the satisfactory performance of the work.

Section 10 Required Bonds and Insurance

(1) Unless otherwise agreed to by the University, within ten (10) working days after the receipt of Letter of Intent, the Contractor shall procure, execute and deliver to the University and maintain, at its own cost and expense:

a. A Performance Bond and a Labor and Material Bond, both of which bonds shall be on the form prescribed by the University and in an amount not less than 100 percent of the total amount of the Contract awarded to the Contractor by the University said bonds must be issued by a surety company approved by the University and authorized to do business in the State of New York as a surety.

b. Attorneys-in-fact who execute said Bonds on behalf of a surety must affix thereto a certified and effectively dated copy of their power of appointment.

(2) Prior to the commencement of work the Successful Bidder will provide, at its sole cost and expense, Certificates of Insurance in accordance with Section 5.06 and 5.07 of the Construction Agreement, which shall remain in force throughout the term of the agreement, or any extension thereof. Such Certificates of Insurances shall be from an insurance company licensed by the New York State Department of Insurance with a rating of at least "A-" as published with Standard & Poor's, and a liability insurance policy with limits no less than **2,000,000.00** per claim. per claim. If during the term of the policy, the carrier's rating falls below "A-", the liability insurance must be replaced no later than the renewal date of the policy with an insurer acceptable to the State of New York. Such policies shall name the STATE UNIVERSITY OF NEW YORK as an additional insured. The policy shall designate the State University of New York as the loss payee and shall contain a provision that the State University of New York shall receive at least thirty (30) days' notice prior to material change, cancellation or expiration of any such policy.

(3) Workers Compensation Insurance & Disability Benefits Coverage
All employees of the Successful Bidder shall be adequately and properly covered by Workers' Compensation Insurance and Disability Benefits coverage for all work related to the resultant contract. Such policies shall name the STATE UNIVERSITY OF NEW YORK as an additional insured and are to be written by recognized and well-rated insurance companies authorized to transact business in the State of New York. The Successful Bidder shall deliver certificates of such coverage, or proof that such coverage is not required, in the required format, as required by the Workers' Compensation Board, to the following when the agreement is signed by the parties and thereafter not less than thirty (30) days prior to material change or cancellation of such coverage.

(4) Proof of insurances with the specific coverage and limits required in Article V of the Agreement. Acceptable documents are:

i. Proof of NYS Worker's Compensation is only accepted on the C-105.2 or U-26.3 form.

ii. Proof of Disability insurance is only accepted on the DB-120.1 form.

Use the link below for a description of the required forms for Workers Compensation and Disability:

http://www.osc.state.ny.us/agencies/guide/MyWebHelp/Content/XI/18/G.htm

iii. All other proof of insurance must be on the Acord 25 Certificate of Liability Insurance form.

iv. A 120-day schedule

a. After receipt of the Letter of Intent but before receipt of the Contract is Awarded, the Contractor, unless otherwise directed by the University, shall update the working plan and schedule previously submitted in accordance with the Information for Bidders to define the contractor's planned operations during the first 120 days and submit it to the University and the Consultant for their acceptance. The updated working plan and schedule shall be in the form of suitable charts, diagrams or bar graphs and shall be based on the Contractor's logic and time estimates. When updated, such plan and schedule shall be sufficiently detailed to show clearly, in sequence, all salient features of the work of each trade including: the anticipated time of commencement and completion of such work and the interrelationship between such work, submission of Shop Drawings and Samples for approval, approval of Shop Drawings and Samples, placing of orders of materials, fabrication and delivery of materials, installation and testing of materials, contiguous or related work under other contracts, and other items pertinent to the work. The Notice to Proceed may be withheld until this schedule is received and is deemed responsive to the project requirements.

b. After Contract Award, but before processing second progress payment application, the Contractor, unless otherwise directed by the University, shall submit to the University and the Consultant for their acceptance its proposed working plan and project time schedule for all the work covered by the Contract, and shall include activities for preparation and submission of all Shop Drawings and Samples. Said proposed working plan and schedule shall be prepared in accordance with the form and requirements set forth in the preceding paragraph.

Section 11 Opportunities Programs

(1) Minority and Women's Business Enterprises

a. Pursuant to New York State Executive Law Article 15-A, the University recognizes its obligation under the law to promote opportunities for maximum feasible participation of certified minority-and women-owned business enterprises and the employment of minority group members and women in the performance of University contracts.

b. For purposes of this solicitation, the University hereby establishes an overall *tentative* goal of ***30%*** for MWBE participation, ***15%*** for Minority-Owned Business Enterprises ("MBE") participation and ***15%*** for Women-Owned Business Enterprises ("WBE") participation (based on the current availability of qualified MBEs and WBEs). *These goals are subject to revision.* For additional information please refer to the MWBE requirements outlined in the Prospective Bidders Notice (Form 7557-121b) and Exhibit A-1.

c. For guidance on how the University will determine a Contractor's "good faith efforts," refer

to 5 NYCRR §142.8.

d. Please note the forms identified in the Prospective Bidders Notice (Form 7557-121b) must be submitted within seven days of the bid opening. Required forms include the MWBE-EEO Policy Statement (Form 7557-104 or equivalent), the MWBE Utilization Plan (Form 7557-107) and the EEO Staffing Plan (Form 7557-108).

e. Any modifications or changes to the MWBE Utilization Plan after the Contract award and during the term of the Contract must be reported on a revised MWBE Utilization Plan and submitted to the University. The University will review the submitted MWBE Utilization Plan and advise the Bidder of the University's acceptance, or issue a notice of deficiency within 30 days of receipt.

(2) Service Disabled Veteran Owned Business Enterprises

a. Consistent with the State University of New York's commitment to, and in accordance with, Article 17-B of the New York State Executive Law, contractors are required to ensure that good faith efforts are made to include meaningful participation by Service Disabled Veteran-Owned Business in SUNY's MWBE Program. The requirements apply to contracts in excess of $100,000.

b. To ensure that SDVOB Enterprises are afforded the opportunity for meaningful participation in the performance of the University's contracts, and to assist in achieving the SDVOB Act's statewide goal for participation on state contracts the University hereby establishes an overall goal of 6% for SDVOB participation for this solicitation.

c. For additional information please refer to the SDVOB requirements outlined in the Prospective Bidders Notice (Form 7564-121b). Please note the SDVOB Utilization Plan Form 7564-107 must be submitted within seven days of the bid opening.

Section 12 Encouraging Use of New York State Business Businesses in Contract Performance

(1) New York State businesses have a substantial presence in State contracts and strongly contribute to the economies of the state and the nation. In recognition of their economic activity and leadership in doing business in New York State, bidders/proposers for this contract for commodities, services or technology are strongly encouraged and expected to consider New York State businesses in the fulfillment of the requirements of the contract. Such partnering may be as subcontractors, suppliers, protégés or other supporting roles.

Bidders/proposers need to be aware that all authorized users of this contract will be strongly encouraged, to the maximum extent practical and consistent with legal requirements, to use responsible and responsive New York State businesses in purchasing commodities that are of equal quality and functionality and in utilizing services and technology. Furthermore, bidders/proposers are reminded that they must continue to utilize small, minority and women-owned businesses, consistent with current State law.

Utilizing New York State businesses in State contracts will help create more private sector jobs, rebuild New York's infrastructure, and maximize economic activity to the mutual benefit of the contractor and its New York State business partners. New York State businesses will promote the

contractor's optimal performance under the contract, thereby fully benefiting the public sector programs that are supported by associated procurements.

Public procurements can drive and improve the State's economic engine through promotion of the use of New York businesses by its contractors. The State therefore expects bidders/proposers to provide maximum assistance to New York businesses in their use of the contract. The potential participation by all kinds of New York businesses will deliver great value to the State and its taxpayers.

a. Information on the availability of New York State subcontractors and suppliers is available from: New York State Department of Economic Development, Procurement Assistance Unit, One Commerce Plaza, Albany, New York 12245, Phone: (518) 474-7756, Fax: (518) 486-7577.

Section 13 Single Contract Responsibility

This is a single bid general construction project. The Contractor submitting the bid is responsible for all work associated with this Project.

Section 14 Examination of Site and Conditions of Work

(1) A pre-bid conference and project walk-through will be held on **April 5th, at 11:00 AM** with all contractors assembled at the **Campus Center North building (The Hub / Food Court), State University of New York Purchase College, 735 Anderson Hill Road, Purchase, NY 10577-1402**. No individual or additional walk-throughs will be provided. Failure to attend a walk-through shall not be the cause for extra payment.

(2) Each bidder must inform itself fully of the conditions relating to the construction of the project and the employment of labor on the project. Failure to do so will not relieve a successful bidder of their obligation to furnish all material and labor necessary to carry out the provisions of their contract. To the extent possible, the contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.

Section 15 General Terms and Conditions

(1) The following items will be incorporated into, and made part of, the formal agreement: (1)the University's Invitation for Bid; (2) the Successful Bidder's proposal; (3) Exhibit A, Standard Contract Clauses; (4) Exhibit A-1, Affirmative Action Clauses; and, (5) Forms A and B Procurement Lobbying Forms.

(2) In the event of any inconsistency in or conflict among the document elements of the agreement described above, such inconsistency or conflict shall be resolved by giving precedence to the document elements in the following order: (1) Exhibits A and A-1; (2) Forms A and B Procurement Lobbying Forms, (3) the Agreement; (4) this IFB; and (5) the Successful Bidder's proposal.

Section 15.1 Vendor Debriefing and Contract Award Protest Procedure

(1) Upon being notified of their unsuccessful bids, unsuccessful bidders may request in writing a debriefing within 15 calendar days of such notice. The 15 day period starts once unsuccessful

bidders are notified. Once a request is made by the bidder, the University must schedule a debriefing within a reasonable time of such request. Unless the campus and bidder mutually agree to use another method such as by telephone, video conference or another type of electronic communication the debriefing must be conducted in person with the bidder.

(2) This procurement is subject to SUNY Procedure Item 7561, Contract Award Protest Procedure.

Section 15.2 Proposal Confidentiality

(1) All proposals and qualifications submitted for the University's consideration will be held in confidence. However, the resulting contract is subject to the New York State Freedom of Information Law (FOIL). Therefore, if an Bidder believes that any information in its proposal constitutes a trade secret or should otherwise be treated as confidential and wishes such information not to be disclosed the Bidder shall submit with its proposal a separate letter to the designated contact. The letter shall specifically identify the page number(s), line(s) or other appropriate designation(s) containing such information, explaining in detail why such information is a trade secret and formally requesting that such information be kept confidential. Failure by an Bidder to submit such a letter will constitute a waiver by the Bidder of any rights it may have under Section 89(5) of the Public Officers' Law relating to protection of trade secrets.

(2) The proprietary nature of the information designated confidential by the Bidder may be subject to disclosure if ordered by a court of competent jurisdiction. A request that an entire proposal be kept confidential is not advisable since a proposal cannot reasonably consist of all data subject to FOIL proprietary status.

Section 15.3 Information Security Breach and Notification Act

(1) The Bidder shall comply with the provisions of the New York State Information Security Breach and Notification Act (General Business Law Section 899-aa and State Technology Law, Section 208). The Bidder shall be liable for the costs associated with such breach if caused by its negligent or willful acts or omissions, or the negligent or willful acts or omissions of its agents, officers, employees or subcontractors.

Section 15.4 State Finance Law §§ 139-j and 139-k

(1) State Finance Law §§139-j and 139-k imposes certain restrictions on communications between the University and a Bidder during the procurement process. During the restricted period the Bidder is restricted from making contacts to other than designated contact unless it is a contact that is included among certain statutory exceptions set forth in State Finance Law §139-j(3)(a). The restricted period is from the earliest notice of intent to solicit offers through final award and approval of the Contract.

(2) University employees and their designated representatives are also required to obtain certain information when contacted during the restricted period and make a determination of the responsibility of the Bidder pursuant to these two statutes. Certain findings of non-responsibility can result in rejection for contract award and in the event of two findings within a 4 year period the Bidder is debarred from obtaining government procurement contracts.

Section 16 Additional Terms and Conditions

(1) The terms and conditions of the State University of New York Construction Agreement (Form

7554-09) shall apply, and is provided as an attachment to this IFB.

(2) The resulting agreement shall be binding upon its execution by both parties and, if required by New York State law, upon the approval of the Attorney General and the Office of the State Comptroller.

(3) The agreement may be revised at any time upon mutual consent of the parties in writing. Such written consent will not be effective until signed by both parties and, if required by New York State law, approved by the Attorney General and the Office of the State Comptroller.

(4) The relationship of the Successful Bidder to the University shall be that of independent contractor.

(5) Compliance with the post-employment restrictions of the Ethics in Government Act is required.

(6) The submission of a proposal constitutes a binding offer to perform and provide said services.

(7) In the event the Successful Bidder uses partners, subcontracts or subcontractors, the Successful Bidder will remain responsible for compliance with all specifications and performance of all obligations under the contract resulting from this IFB. For the resulting agreement, the Successful Bidder will be the prime contractor.

(8) The University will not be liable for any costs associated with the preparation, transmittal, or presentation of any proposals or materials submitted in response to this IFB.

(9) Public announcements or news releases regarding this IFB or any subsequent award of a contract must not be made by any Bidder without the prior written approval of SUNY.

(10) The Successful Bidder is responsible for compliance with all applicable rules and regulations pertaining to cities, towns, counties and State where the services are provided, and all other laws applicable to the performance of the resulting contract. The Successful Offeror shall provide all necessary safeguards for safety and protection as set forth by the United States Department of Labor, Occupational Safety and Health Administration.

(11) The Successful Bidder will be responsible for the work, direction and compensation of its employees, consultants, agents and contractors. Nothing in the resulting agreement or the performance thereof by the Successful Bidder will impose any liability or duty whatsoever on the University including, but not limited to, any liability for taxes, compensation, commissions, Workers' Compensation, disability benefits, Social Security, or other employee benefits for any person or entity.

(12) In the event the Successful Bidder is required to be reimbursed for travel, Bidder shall be reimbursed at rates not to exceed the current NYS Schedule of Allowable Reimbursable Travel Expenses. Refer to the U.S. Government Administration Rates for Travel at: http://www.gsa.gov

(13) In addition, the University reserves the right to:

a. Not accept any and all proposals received in response to this IFB, waive requirements or amend this IFB upon notification to all bidders, waive minor irregularities or adjust or correct cost or cost figures with the concurrence of the bidder if mathematical or typographical errors exist.

b. To terminate any resulting contract for: (1) unavailability of funds; (2) cause; (3) convenience; (4) in the event it is found that the certification filed by the Bidder in accordance with State Finance Law §§139-j and 139-k are found to be intentionally false or intentionally incomplete; and if applicable, the Department of Taxation and Finance Contractor Certification Form ST-220CA was false or incomplete. Upon such finding the University may exercise its termination right by providing written notification to the Bidder in accordance with the written notification terms of the contract.

c. Request certified audited financial statements for the past three (3) completed fiscal years and/or other appropriate supplementation including, but not limited to, interim financial statements and credit reports.

d. Contact any or all references.

e. Request clarifications from Bidders for purposes of assuring a full understanding of responsiveness, and further to permit revisions from all Bidders determined to be susceptible to being selected for contract award, prior to award.

f. Advise Bidder of any objectionable employee(s) and/or subcontractor(s) and request their removal from the project. Such removal shall not be reasonably withheld by the Bidder.

Section 17 Purchase College Policies

All State University of New York Purchase College policies must be followed by Contractor while on the Purchase College grounds and in providing the goods and/or services of this solicitation to Purchase College.

The Purchase College policies include:
(1) Domestic Violence in the Workplace policy
(2) Nondiscrimination policy
(3) Policy on Sexual Harassment
(4) Regulations for a Drug Free Environment and Information on Counseling and Treatment
(5) Tobacco Free Policy
(6) Title IX of the Education Amendments

The full text of the above listed Purchase College policies can be accessed at:
https://www.purchase.edu/offices/purchasing/policies/

_____
NAME OF BIDDER

_____
ADDRESS OF BIDDER

PROPOSAL
FOR

Project Number: SU-031918 Date: _____
Project Name: **Café Addition and Renovation**

TO THE STATE UNIVERSITY OF NEW YORK:

1. **The Work Proposed Herein Will Be Completed Within 89 Calendar Days, Starting 10 Calendar Days After The Contract Approval Date.** In the event the bidder fails to complete such work by said date or dates, or within the time to which such completion may have been extended in accordance with the Contract Documents, the bidder agrees to pay the University liquidated damages in an amount equal to the values indicate in the Liquidated Damages Schedule below for each calendar day of delay in completing the work.

LIQUIDATED DAMAGES SCHEDULE

Contract Amount	***Liquidated Damages***
Under $100,000	**$100/day**
$100,000-$499,999	**$200/day**
$500,000-$999,999	**$300/day**
$1MM-$1,999,999	**$400/day**
$2MM-$3,499,999	**$500/day**
$3.5MM-$5MM	**$700/day**
Over $5MM (to be determined by the University in each instance)	**$_____/day**

2. The bidder hereby declares that it has carefully examined all Bidding and Contract Documents and that it has personally inspected the actual location of the work, together with the local sources of supply, has satisfied itself as to all the quantities and conditions, and understands that in signing this Proposal, it waives all right to plead any misunderstanding regarding the same.

3. The bidder further understands and agrees that it is to do, perform and complete all work in accordance with the Contract Documents and to accept in full compensation therefore the amount of the Total Bid, modified by such additive or deductive alternates, if any, as are accepted by the University.

4. The bidder further agrees to accept the unit prices, if any, set forth in paragraph (5) of this proposal, except as the same may be modified pursuant to the provisions of Section (5) of the Information to Bidders, as full payment for the amount of the credit to the University for any deletions, additions, modifications or changes to the portion or portions of work covered by said unit prices.

5. **BID CALCULATION**

a. **BASE BID** *(does not include allowances)*

$_____
(in numbers)

_____
(in words)

b. **ALLOWANCES:** In accordance with the Schedule I and Section 4.05 of Agreement, the bidder further agrees to the following additions to the Base Bid:

Work or Materials Description	Amount in Words	Amount in Figures

c. **TOTAL BID** *(base bid + allowances = total bid)*

$_____
(in numbers)

_____
(in words)

d. **ALTERNATES**: In accordance with Section B of the General Requirements the bidder proposes the following additions to or deductions from the Total Bid for the alternates listed below:

Alternate Number	Add/Deduct	Amount in Words	Amount in Figures
# 1 Chilled Water Booster Pump			
# 2 Heat Trace			
# 3 Transfer Switch			

e. **UNIT PRICES**: In accordance with Section (5) paragraph (2) of the Information to Bidders and Section 4.04 of the Agreement the bidder or the University may insert unit prices for the work or materials listed below for clarification.

Work or Materials Description	Amount in Words	Amount in Figures

6. 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 its knowledge and belief: (a) 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; (b) unless otherwise required by law, the prices 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 (c) no attempt has been made or will be made by the bidder to induce any person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

   A bid shall not be considered for award nor shall any award be made where (a), (b) and (c) 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 therefor. Where (a), (b), and (c) above shall have not been complied with, the bid shall not be considered for award nor shall any award be made unless the Campus President, or designee, or Vice Chancellor for Capital Facilities, or designee, determines that such disclosure was not made for purposes 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 of this Section.

7. The bidder agrees that if awarded the Contract, it will commence work within (10) calendar days after date of receipt of a fully executed Agreement and that it will fully complete the work by the date stated herein.

8. The bidder acknowledges the receipt of the following addenda, but agrees that it is bound by all addenda whether or not listed herein.

Addendum Number	Date	Addendum Number	Date
_____	___/___/___	_____	___/___/___
_____	___/___/___	_____	___/___/___
_____	___/___/___	_____	___/___/___

9. The bidder submits herewith bid security in an amount not less than five (5) percent of the Total Bid. In the event that (a) the bidder's Total Bid is the lowest one submitted and the bidder does not timely provide the Post-Bid Information required by the Information for Bidders or (b) this Proposal is accepted by the University and the bidder shall refuse or neglect, within ten (10) calendar days after date of receipt of Agreement, to execute and deliver said Agreement in the form provided herein, or to execute and deliver a Performance Bond and a Labor and Material Bond in the amounts required and in the form prescribed, the bidder shall be liable to the University, as liquidated damages, for the amount of the bid security or the difference between the Total Bid of the bidder and the Total Bid of the bidder submitting the next lowest bid, whichever sum shall be higher, otherwise the total amount of the bid security will be returned to the bidder in accordance with the provisions set forth in the Information for Bidders. The University may apply the bid security in full or partial payments, as the case may be, of said liquidated damages and in the event the bid security is less than the amount of liquidated damages to which the University is entitled, the bidder shall pay the difference, upon demand, to the University.

10. The bidder certifies that all wood products that are to be used in the performance of this Contract shall be in accordance with the Specifications and provisions of Section 167 b. of the State Finance Law which Section prohibits the purchase and use of tropical hardwoods.

11. The bidder affirms that it understands and agrees to comply with the procedures of the Fund relative to permissible contacts as required by Sections 139-j(3) and 139-j-(6)(b) of the State Finance Law.

12. The bidder certifies that all information provided or to be provided to the University in connection with this procurement is, as required by Section 139-k of the State Finance Law, complete, true and accurate.

Dated _____/_____/_____

Firm's Federal ID Number or
Social Security Number as applicable _____

Legal name of person, partnership, joint venture or corporation:

_____

By_____
(signature)

Title_____

Email_____

ACKNOWLEDGMENT FOR THE PROPOSAL

THE LEGAL ADDRESS OF THE BIDDER

_____

_____

_____

_____

Telephone No._____ Facsimile No._____

If a Corporation

Name Address

_____PRESIDENT _____

_____SECRETARY _____

_____TREASURER _____

If a Partnership

Name of Partners Address

_____ _____

_____ _____

_____ _____

If a Joint Venture

Name of Members Address

_____ _____

_____ _____

_____ _____

If an Individual

Name of Individual Address

_____ _____

Attachment A – List of Completed Similar Construction Projects

Bidder Name: **Project No.:**

Bidders must provide three (3) example projects completed in the past five (5) years in which the Bidder served as the prime contractor. Example projects must be of similar size, scope and complexity to the project currently being bid, as further described in the Description of Work. Each project must include the Owner/Agency, Award Date, Contract Amount, Date Completed, Contact Person, Telephone number of the contact, Architect and/or Engineer's Name, Contract Number, Contact Email, and the Project Title and a brief scope description. Reference contacts may be used to verify project size, scope, dollar value, percentages and quality of performance.

1.	Agency/Owner			Award Date	Contract Amount / Date Completed
	Agency/Owner Contact Person		Telephone No.	Designer Architect and /or Design Engineer	
	Contract No.	Contact Email	Project Title & Scope		
2.	Agency/Owner			Award Date	Contract Amount / Date Completed
	Agency/Owner Contact Person		Telephone No.	Designer Architect and /or Design Engineer	
	Contract No.	Contact Email	Project Title & Scope		
3.	Agency/Owner			Award Date	Contract Amount / Date Completed
	Agency/Owner Contact Person		Telephone No.	Designer Architect and /or Design Engineer	
	Contract No.	Contact Email	Project Title & Scope		

Completed By:	Phone Number: Email: Date:

Division 1 - General Requirements
SECTION A - Description of Work

1. Work to be Done

The work to be done under the Contract, in accordance with the Contract Documents, consists of performing, installing, furnishing and supplying all materials, equipment, labor and incidentals necessary or convenient for the construction of Project Number, **SU-031918**, titled **Café Addition and Renovation** and carry out all of the duties and obligations imposed upon the Contractor by the Contract Documents.

The main features of the work shall include, but not be limited to the following:
New one-story addition and full interior renovation to an existing dining commons. Extent of work shall include (1) new structural and structural modifications, (2) the expansions and renovations of all mechanical, electrical, plumbing, and fire protection within the scope area, (3) site work for new utility services, grease trap, and courtyard, and (4) all new architectural design and finishes of scope area.
Reference Project Manual – SUMMARY section for additional information.

2. Work Not Included:

Work not included in the work of the Contract are those items marked "N.I.C"; movable furnishings, except those specifically specified or indicated on the Drawings; and items marked "by others".
Work Not included in Contract shall include:

- ***Millwork (Blocking, preparation, and final utility connections shall be provided as part of contract)***
- ***Food service equipment. (Kitchen exhaust hoods shall be provided as part of contract)***
- ***Walk-in coolers and freezers***
- ***Built-up Roof System, equipment curbing, penetrations for vents/conduits/power, flashing/edge metal. (Roof drains shall be provided as part of contract)***
- ***All Furniture***
- ***Data/low voltage cabling and associated equipment. (All pathways and power shall be provided as part of contract)***

Reference Project Manual – SUMMARY section for additional information.

SECTION B - Alternates

1. General

a. Refer to Proposal Form. State thereon the amount to be added to or deducted from the Total Bid for the Alternates described herein.

b. Extent and details of the Alternates are indicated on the Drawings, and described in the Specifications.

c. Where reference is made in the description of the Alternate to products, materials, or workmanship, the specification requirements applicable to similar products, materials or workmanship in the Total Bid shall govern the products, materials, and workmanship of the Alternate as if these specification requirements were included in full in the description of the Alternates.

2. Alternates

Reference Project Manual – ALTERNATES section for list and description of each alternate.

SECTION C - Special Conditions

1. Cutting and Patching

a. The Contractor shall do all cutting, fitting, and patching of its work that may be required to make its several parts come together properly and fitted as shown upon or reasonably implied from the Drawings and Specifications for the completed project.

b. Any cost caused by defective or ill-timed work shall be borne by the Contractor. Except as otherwise expressly provided in the Contract Documents, the Contractor shall not cut or alter the work of any other Contractor or existing work without the consent of the University.

c. Existing construction, finishes, equipment, wiring, etc., that is to remain and which is damaged or defaced by reason of work done under this contract shall be restored by the Contractor to a condition satisfactory to the University, or replaced with new, at no additional cost.

d. Existing surfaces, materials, and work shall be prepared as necessary to receive the new installations. Such preparatory work shall be as required by the conditions and in each case shall be subject to approval by the University.

e. Newly exposed work or surfaces which are presently concealed shall be made to match existing corresponding or adjoining new surfaces as directed, and the materials and methods to be employed shall be subject to approval by the University.

f. All new, altered, or restored work in the building shall match existing corresponding work in the material, construction finish, etc., unless otherwise specified or required by the drawings.

Reference Project Manual – CUTTING AND PATCHING section for additional information.

2. Clean-Up

a. Periodic Cleaning: The Contractor shall at all times during the progress of the work keep the Site free from accumulation of waste matter or rubbish and shall confine its apparatus, materials and operations of its workmen to limits prescribed by law or by the Contract Limit Lines, except as the latter may be extended with the approval of the University. Cleaning of the structure(s), once enclosed, must be performed daily and removal of waste matter or rubbish must be performed at least once a week.

b. Final Clean Up: Upon completion of the work covered by the Contract, the Contractor shall leave the completed project ready for use without the need of further cleaning of any kind and with all work in new condition and perfect order. In addition, upon completion of all work, the Contractor shall remove from the vicinity of the work and from the property owned or occupied by the State of New York, the State University of New York or the University, all plant, buildings, rubbish, unused materials, concrete forms and other materials belonging to it or used under its direction during construction or impairing the use or appearance of the property and shall restore such areas affected by the work to their original condition, and, in the event of its failure to do so, the same shall be removed by the University at the expense of the Contractor, and it and its surety shall be liable therefor.

Reference Project Manual – CLOSEOUT PROCEDURES and EXECUTION sections for additional information.

3. Temporary Access and Parking

Reference site drawings for staging location and reference Project Manual – TEMPORARY FACILITIES AND CONTROLS section for general requirements

4. Field Meetings

Periodic job meetings will be scheduled by the Consultant and the University during the course of construction. The Contractor, and, upon request of the Consultant and the University, its principal subcontractors and manufacturer's representatives, shall attend such meetings and be prepared to furnish answers to questions on progress, workmanship, or any other subject on which the Consultant and the University might reasonably require information.

Reference Project Manual – PROJECT MANAGEMENT AND COORDINATION section for additional information.

5. Operating Instructions and Manuals

The Contractor shall furnish three (3) complete sets of operating instructions and manuals which shall include definite and specific instructions on all mechanical and electrical systems involved in the Project. Said instructions and manuals should set forth: (1) the manner of operation; (2) the necessary precautions and care to be followed: (3) periodic prevention maintenance requirements; and (4) a complete set of spare parts lists, catalogs, service manuals and manufacturing data on said systems. Said instructions and manuals are to be made available by the Contractor for review and comment by the University a minimum of six (6) weeks prior to the scheduled completion of the Project.

Reference Project Manual – OPERATION AND MAINTENANCE DATA section for additional information.

6. Utility Shutdowns and Cut Overs

a. Except as otherwise expressly provided in the Contract Documents, the Contractor shall be responsible for submitting to the University, for its approval, a proposed schedule of all utility shutdowns and Cut overs of all types which will be required to complete the Project; said schedule should contain a minimum of two (2) week's advance notice prior to the time of the proposed shutdown and cut over. Most campuses of the State University of New York are in full operation 12 months of the year, and shutdowns and Cut overs, depending upon their type, generally must be scheduled on weekends, at night, or during holiday periods. The contract consideration is deemed to include all necessary overtime and all premium time, if any, that is required by the Contractor to complete the shutdowns or Cut overs.

b. Temporary Connections: In the event the Contractor shall disrupt any existing services, the Contractor shall immediately make temporary connection to place such service back into operation and maintain the temporary connection until the Contractor makes the permanent connection. All work must be acceptable to the University.

7. Temporary Power for Construction Activities

Electrical energy will be available at no cost to the Contractor from existing outlets or panels from locations approved by the College. This power may be used for small power tools (not exceeding 1/2 HP), etc., and the Contractor shall not exceed the capacity of the existing circuits being used. The Contractor shall be responsible for providing all necessary connections, cables, etc. and removal of the same at completion of construction with approval from the University. The Contractor shall in no way modify the existing circuits at the panel boards to increase capacities of the circuits. If the required power load exceeds the capacities of the available power sources, the Contractor shall be responsible and pay for furnishing and installing all necessary temporary power poles, cables, fused disconnect switches, transformers and electric meters necessary to provide a temporary power system for the project, and remove the same at completion. Install all temporary wiring and equipment and make all connections in conformity with the National Electrical Code. Make all replacements required by temporary use of the permanent wiring system. Provide ground fault protection.

Reference Project Manual – TEMPORARY FACILITIES AND CONTROLS section for additional information.

8. Sanitary Facilities

The Contractor will be permitted to use existing toilet and janitor closet facilities as designated by the College provided the existing facilities are not misused, defaced, or left in an unsanitary condition. If the University deems that the existing facilities have been subject to misuse or left unsanitary, the Contractor shall be informed and caused to install and maintain (at its own cost) temporary, sanitary facilities at approved locations. The Contractor shall also be held responsible for the cost of cleaning and repair of any damage to said existing facilities and adherence to health and sanitary codes of the State of New York.

Reference Project Manual – TEMPORARY FACILITIES AND CONTROLS section for additional information.

9. Temporary Heat

a. In those locations where it is required by the conditions of the work, the Contractor shall provide and pay for all temporary heating, coverings and enclosures necessary to properly protect all work and materials against damage by dampness and cold, dry out the work, and facilitate the completion thereof. Fuel, equipment, materials, operating personnel and the methods used therefor shall be at all times satisfactory to the University and adequate for the purpose intended. The Contractor shall maintain the critical installation temperatures, provided in the technical provisions of the specifications hereof, for all work in those areas where the same is being performed.

b. Maintenance of proper heating, ventilation and adequate drying out of the work is the responsibility of the Contractor. Any work damaged by dampness, insufficient or abnormal heating shall be replaced to the satisfaction of the University by and at the sole cost and expense of the Contractor.

c. The Contractor shall provide all necessary, temporary heating for the efficient and effective work by itself and all trades engaged in the work. Unless otherwise specified, the minimum temperature shall be 50 degrees F at all places where work is actually being performed within the project (where enclosed). Before and during the placing of wood finish and the application of other interior finishing, varnishing, painting, etc., and until final acceptance by the University of all work covered by the Contract, the Contractor shall, unless otherwise specified in the Contract Documents, provide sufficient heat to produce a temperature of not less than 68 degrees F nor more than 78 degrees F.

Reference Project Manual – TEMPORARY FACILITIES AND CONTROLS section for additional information.

10. Temporary Light

The contractor shall install, maintain and remove Underwriter's Label temporary lighting sockets, light bulbs, and intermittent power sockets as approved by the University. The minimum temporary lighting to be provided is at the rate of 1/4 watt per square foot and be maintained for 24 hours, 7 days per week at stairs and exit corridors; in all other spaces, temporary lighting is to be maintained during working hours. Installation shall be in accordance with the National Electric Code.

Reference Project Manual – TEMPORARY FACILITIES AND CONTROLS section for additional information.

11. Temporary Water for Construction Purposes

Water for construction is available through the campus system without charge to the Contractor from location designated by the College. The Contractor shall obtain the necessary permission, make all connections, as required, furnish and install all pipes and fittings, and remove the same at completion of work. The Contractor must provide for waste water discharge and shall take due care to prevent damage to existing structures or site and the waste of water. All pipes and fittings must be maintained in perfect condition at all times.

Reference Project Manual – TEMPORARY FACILITIES AND CONTROLS section for additional information.

12. Conducting Work

a. All work is to be conducted in such a manner as to cause a minimum degree of interference with the College's operation and academic schedule.

b. Safe and direct entrance to and exiting from the existing buildings shall be maintained at all times during regular hours while construction is in progress.

c. No construction work will start in any area until the Contractor has all the required materials on-site.

d. The Contractor and its employees shall comply with College regulations governing conduct, access to the premises, and operation of equipment.

e. The building shall not be left "open" overnight or during any period of inclement weather. Temporary weather tight closures shall be provided for/by the Contractor to protect the structure and its contents.

Reference Project Manual – PROJECT MANAGEMENT AND COORDINATION section for additional information.

13. Safety and Protective Facilities

a. The Contractor shall provide the necessary safeguards to prevent accidents, to avoid all necessary hazards and protect the public, the Staff, students, the work and property at all times, including Saturdays, Sundays, holidays and other times when no work is being done.

b. The Contractor shall erect, maintain and remove appropriate barriers or other devices, including mechanical ventilation systems, as required by the conditions of the work for the protection of users of the project area, the protection of the work being done, or the containment of dust and debris. All such barriers or devices shall be provided in conformance with all applicable codes, laws and regulations, including OSHA and National Fire Prevention Association 241, for safeguarding of structures during construction.

c. The Contractor shall not interfere with the operation of the building fire alarm system. When necessary, portions of the fire alarm system may be temporarily disabled with the approval of the College.

Reference Project Manual – PROJECT MANAGEMENT AND COORDINATION section for additional information.

14. Protection of Existing Structures, Vegetation and Utilities

The Contractor, during the course of its work, shall not damage any buildings, structures and utilities, public

or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains and electric power and lighting and telephone cables, lawns, curbs, plants and other improvements. Any damage resulting from the Contractor's operations shall be repaired or replaced at its expense.

Reference Project Manual – PROJECT MANAGEMENT AND COORDINATION section for additional information.

15. Abbreviations and References

The following abbreviations may be used in these Specifications:

N.A.	Not Applicable
N.I.C	Not in Contract.
Fed. Spec. or F.S.	Federal Specifications
SUCF	State University Construction Fund
University or SUNY	State University of New York
College	A Campus of the State University of New York

Reference Project Manual – REFERENCES section for additional information.

16. Use of Elevators

The Contractor shall be permitted to make temporary use of elevators designated by the University and provided such use does not interfere with the normal activities of the College. Large and heavy items shall not be placed in elevators, and suitable padding shall be provided whenever a cab is used for construction purposes. Elevator pits shall be kept free of debris and dust by frequent cleaning out. The elevators shall be restored to original condition satisfactory to the University at the end of construction activities. Use of the top of the elevator may be permitted after obtaining approval of the University.

17. Salvage of Materials

Remove and legally dispose of all debris and other materials resulting from the alterations to State University property. The following items shall remain the property of the University and shall be stored at the site as directed by the University:

- ***All Fixtures, Furniture, and Equipment***
- ***All Kitchen and Food Service Equipment***
- ***All IT devices***

18. Storage of Materials

a. The Contractor shall store materials and equipment within the contract limits in areas on the site as designated by the University.

b. All materials shall be stored in a neat and orderly manner, and shall be protected against the weather by raised floored weatherproof temporary storage facility or trailer.

c. Security for stored materials shall be the responsibility of the Contractor.

d. Storage of materials is not permitted on the roof of any building.

Reference Project Manual individual sections for additional storage information.

19. Shop Drawings and Samples - (Refer to Section 2.19 of the Agreement)

a. The Contractor shall submit to the University for its approval five (5) sets of prints of all shop drawings required by the specifications. Those marked:

"REJECTED" are not in accordance with the Contract Documents and shall be resubmitted.

"REVISE AND RESUBMIT" Contractor shall correct and resubmit.

"MAKE CORRECTIONS NOTED": The contractor shall comply with corrections and may proceed.
Resubmittal is not required.

"APPROVED - NO EXCEPTIONS TAKEN": The contractor may proceed.

b. All shop drawings and/or submittals used on the construction site must bear the impression of the consultant's review stamp as well as the General Contractor's review stamp, indicating the status of review and the date of review.

c. All shop drawings shall reflect actual site conditions and accurate field dimensions. Dimensioned shop drawings shall be submitted for all fabricated items. Incomplete submittals will be rejected without review.

d. All shop drawings, submittals and samples shall include:
   1). Date and revision dates.
   2). Project title and number.
   3). Names of:
      a). Contractor
      b). Subcontractor
      c). Supplier
      d). Manufacturer
   4). Identification of products or materials: Include Department of State (DOS) file number, manufacturers' name and market name of all covered products and applicable materials in accordance with Part 1120 of the Code. This information may be obtained by contacting the DOS, Office of Fire Prevention and Control: 518 474-6746 [voice] and 518 474-3240 [FAX])

Reference Project Manual – SUBMITTAL PROCEDURES section and individual sections for additional information.

20. U.S. Steel

All structural steel, reinforcing steel, or other major steel items to be incorporated in the work shall, if this Contract is in excess of $100,000, be produced or made in whole or substantial part in the United States, its territories or possessions.

21. Non-Asbestos Products

a. All materials specified herein shall contain no asbestos.

b. Provide "Contains No Asbestos" permanent labels applied to the exterior jacket of all pipe insulation at 20 foot intervals with a minimum of one (1) label for each service in each work area.

22. Safety Data Sheet

The contractor shall submit SDS (Safety Data Sheet) for all chemicals, solvents, and materials specified or

proposed to be used on this project.

23. Architect's/Engineer's Seal

In accordance with Rules and Regulations of the New York State Education Law, Title 8, Part 69.5(b), to all plans, specifications and reports to which the seal of an architect has been applied, there shall also be applied a stamp with appropriate wording warning that it is a violation of the law for any person, unless acting under the direction of a licensed architect, to alter an item in any way. If an item bearing the seal of an architect is altered, the altering architect shall affix to his item the seal and the notation "altered by" followed by his signature and the date of such alteration, and a specific description of the alteration.

24. Construction Permit

The Code Compliance Manager for the State University Campus will, as required by law, issue a Construction Permit for this Project. The project is not subject to any local building code or permit requirements, except for work that the Contractor is to perform on property located outside of the boundaries of the campuses of the State University of New York.

25. Other Contracts

There may be other contracts let for work to be done in adjacent areas and, as such, this Contractor and such other contractors shall coordinate their work to conform with progressive operation of all the work covered by such contracts, and afford each other reasonable opportunities for the introduction and storage of their supplies, materials, equipment, and the execution of their work.

26. Asbestos

If the work to be done under this contract contains the abatement of asbestos the following shall apply:

a. Applicable Regulations - All work to be done under this Contract shall be in compliance with Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York (cited as 12 NYCRR Part 56) as amended effective March 21, 2007.

b. Applicable Variance - The abatement contractor is responsible for obtaining any variance not issued to date that he feels may be applicable to the policies/procedures as set forth in 12 NYCRR Part 56.

c. Owner Project Fact Sheet -The Contractor shall complete and submit as much information as possible on the Asbestos Material Fact Sheet to the University in triplicate prior to the project startup. Completion of the Fact Sheet shall be submitted prior to acceptance.

d. Patent Infringement - The State University of New York and the State University Construction Fund have been given notice by a law firm representing GPAC, Inc. that the use of its process/procedure for asbestos containment and removal constitutes a patent infringement. All potential contractors are hereby notified that they may have to obtain a license to use certain patented Negative Air Containment systems, and that any liability of the University in connection therewith is covered by Section 2.21 of the Agreement. Therefore, all potential contractors are hereby notified that after opening of the bids they must advise the University as to the system they intend to use for Negative Air Containment and provide the University with either a

copy of their license to use the same or written documentation, signed by an authorized officer of their surety, that their performance bond guarantees the Contractor's indemnification covering patent claims.

e. Project Monitoring - The College shall employ an independent third party firm to perform the project monitoring requirements of 12 NYCRR Part 56.

f. Not used

g. Disposal Procedures - It is the responsibility of the asbestos contractor to determine current waste handling, transportation and disposal regulations for the work site and for each waste disposal landfill. The asbestos contractor must comply fully with these regulations, all appropriate U.S. Department of Transportation, EPA and Federal, State and local entities' regulations, and all other then current legal requirements. Submit originals or copies of all pertinent manifests in triplicate to the University.

h. Submittals - Prior to commencement of the work on this project, the Contractor must submit the following to the University:

1). Copy of original insurance policy.

2). Copy of Department of Labor notification.

3). Owner Fact Sheet.

4). Copy of EPA notification.

5). Copy of abatement contractor, supervisor and worker asbestos licenses issued by New York State

i. Special Requirements -. 1) Size, location, and quantities of all pipes, joints, ducts, valves, tees, etc. must be field verified by all prospective bidders. Information given on the drawings and specifications is for general orientation and information only.

2) The Contractor shall have at least one English-speaking supervisor on the ob site at all times while the project is in progress.

3) Prior to the commencement of work involving asbestos demolition, removal, renovation, the Contractor must submit to the University the name of its on-site asbestos supervisor responsible for such operations, together with documentation that such supervisor has completed an Environmental Protection Agency-approved training course for asbestos supervisors.

27. Wage Rates and Supplements

The following are the rates of wages and supplements determined by the Industrial Commissioner of the State of New York as prevailing in the locality of the site at which the work will be performed:

SECTION 003126 – EXISTING HAZARDOUS MATERIALS INFORMATION

PART 1 - GENERAL

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. A Pre-Renovation Inspection for Asbestos Containing Materials (ACM) report for Project, prepared by QuES&T, dated February 7, 2018, is appended to this Document.

C. An existing lead report for Project, prepared by QuES&T, dated February 7, 2018, is appended to this Document.

D. An existing PCB (Polychlorinate Biphenyl) information report for Project, prepared by QuES&T, dated February 7, 2018, is appended to this Document.

E. Related Requirements:

1. Division 00 Section "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.
2. Division 02 Section "Selective Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 003126

QuES&T
Quality Environmental Solutions & Technologies, Inc.

PRE-RENOVATION INSPECTION FOR ASBESTOS-CONTAINING MATERIALS (ACM)

for

SUNY PURCHASE ASSOCIATION
735 Anderson Hill Rd.
Purchase, NY 10577

at

Café Building Renovation
735 Anderson Hill Rd.
Purchase, NY 10577

Project #Q18-1530

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

QuES&T

Quality Environmental Solutions & Technologies, Inc.

February 7, 2018

SUNY Purchase Association
735 Anderson Hill Rd.
Purchase, NY 10577

ATTN: Patrick Savolskis

Via Email: patrick.savolskis@purchase.edu

Re.: SUNY Purchase
Café Building Renovation
Pre-Renovation Asbestos Inspection
QuES&T Project #Q18-1530

Dear Mrs. Savolskis,

Attached is the Pre-Renovation Inspection Report for Asbestos-containing Materials (ACM) identified throughout the interior Renovation Areas included within the above-referenced location(s) by **Qu**ality **E**nvironmental **S**olutions **& T**echnologies, Inc. **(QuES&T)**. The inspection included visual assessment and representative sampling for the detection of ACM in compliance with the requirements of Title 12 NYCRR Part 56-5.1.

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

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

Sincerely,

Tanay Ranadive

Tanay Ranadive
Field and Technical Services
NYS AHERA Inspector
Cert. #AH 15-10696
NYS Mold Assessor

Cc: lgoldstein@qualityenv.com
QuES&T File

Table of Contents

I. INTRODUCTION:

Quality **E**nvironmental **S**olutions **& T**echnologies, Inc. **(QuES&T)** performed an Asbestos Survey for Building/Structure Renovation, Remodeling and Repair, in conformance with Title 12 NYCRR Part 56-5.1, on January 17, 2018 and February 2, 2018 for SUNY Purchase Association in support of the upcoming renovation project in the Café Building at SUNY Purchase located at 735 Anderson Hill Rd, Purchase NY, 10577. The survey included a visual inspection/assessment suspect miscellaneous Asbestos-containing Materials (ACM) throughout accessible interior areas of Café.

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

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

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

Certified **QuES&T** personnel (Appendix C), Mr. James D. Klemm (Cert. #AH 13-11486) & Mr. Shannon D. Talsma (Cert. #AH 16-07559) performed visual assessments throughout interior and exterior locations identified. A total of **one hundred twenty-six (126)** samples of installed and accessible suspect building materials were analyzed by a laboratory approved under the NYSDOH ELAP. **Forty-nine (49)** samples were analyzed using Polarized Light Microscopy (PLM) for friable materials; **thirty-eight (38)** samples were analyzed using Polarized Light Microscopy (PLM-NOB) for non-friable organically bound materials; and, **thirty-six (36)** samples were analyzed by Confirmatory-QTEM following negative-determinations using PLM-NOB protocols. **Three (3)** samples of Sprayed-On Fireproofing were analyzed by PLM (198.8) for surfacing materials containing vermiculite.

II. INSPECTION SUMMARY:

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

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

- Ceiling Materials – Sheetrock, Fiberboard, Ceiling Tile System (Multiple Varieties), Glue Dabs
- Wall Materials – Joint Compound & Sheetrock, Fiberboard, Cementitious Block & Mortar, Brick & Mortar, Adhesive, Cove Base Molding & Adhesive
- Flooring Materials – Quarry Tile, Grout & Mudset, Ceramic Tile System (Grout, Mudset), Cementitious Slab, Floor Tile & Mastic, Leveling Compound & Mastic, Epoxy Flooring
- Thermal System Insulation Materials – Mudded Joint Packing, Sprayed-On Fireproofing
- Exteriors Materials – Caulk, Waterproofing Tar, Weather Strip
- Miscellaneous Materials – Canvas Wrap, Sealant

III. IDENTIFIED ASBESTOS-CONTAINING MATERIALS (ACM):
(Please see attached Drawings for approx. ACM locations)

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

Location	Material	Approx. Qty.	Friable?	Condition
Café Building - Basement				
Basement, Storage Room, Closet A, Wall, on Cementitious Block	Glue Dabs	9 SF	No	Good
Basement, Storage Room, Closet A, Wall, on Cementitious Block	Glue Dabs	9 SF	No	Good
Storage Room, Rear Wall, By Closets A & B, on Sheetrock	Joint Compound	350 SF	Yes	Good
Closet A & B Upper Wall, Closet A Soffit, On Sheetrock	Joint Compound	150 SF	Yes	Good
Fan Room, Soffit, on Sheetrock	Joint Compound	300 SF	Yes	Good
Café Building – Main Area				
Staff Lounge, on Sheetrock	Joint Compound	150 SF	Yes	Good
Office 1 & 2, on Sheetrock	Joint Compound	350 SF	Yes	Good
Dining Area, on Sheetrock	Joint Compound	3,300 SF	Yes	Good
Café Building – Exteriors				

Note(S):

- ACM Waterproofing Tar was identified on concrete foundation below grade.

IV. GENERAL DISCUSSION:

All construction personnel as well as individuals who have access to locations where asbestos containing materials (ACM) exists should be informed of its presence and the proper work practices in these areas. Conspicuous labeling of all ACM is suggested to ensure personnel is adequately informed. Personnel should be informed not to rest, lean or store material or equipment on or near these surfaces and not to cut, saw, drill, sand or disturb ACM. All removal, disturbance, and repair of ACM should be performed in compliance with Title 12 NYCRR Part 56 by persons properly trained to handle ACM. Facility custodial and maintenance personnel should receive training commensurate with their work activities; as defined in 29 CFR 1910.1001.

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

V. ABATEMENT REQUIRED:

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

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

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

VI. DISCLAIMERS

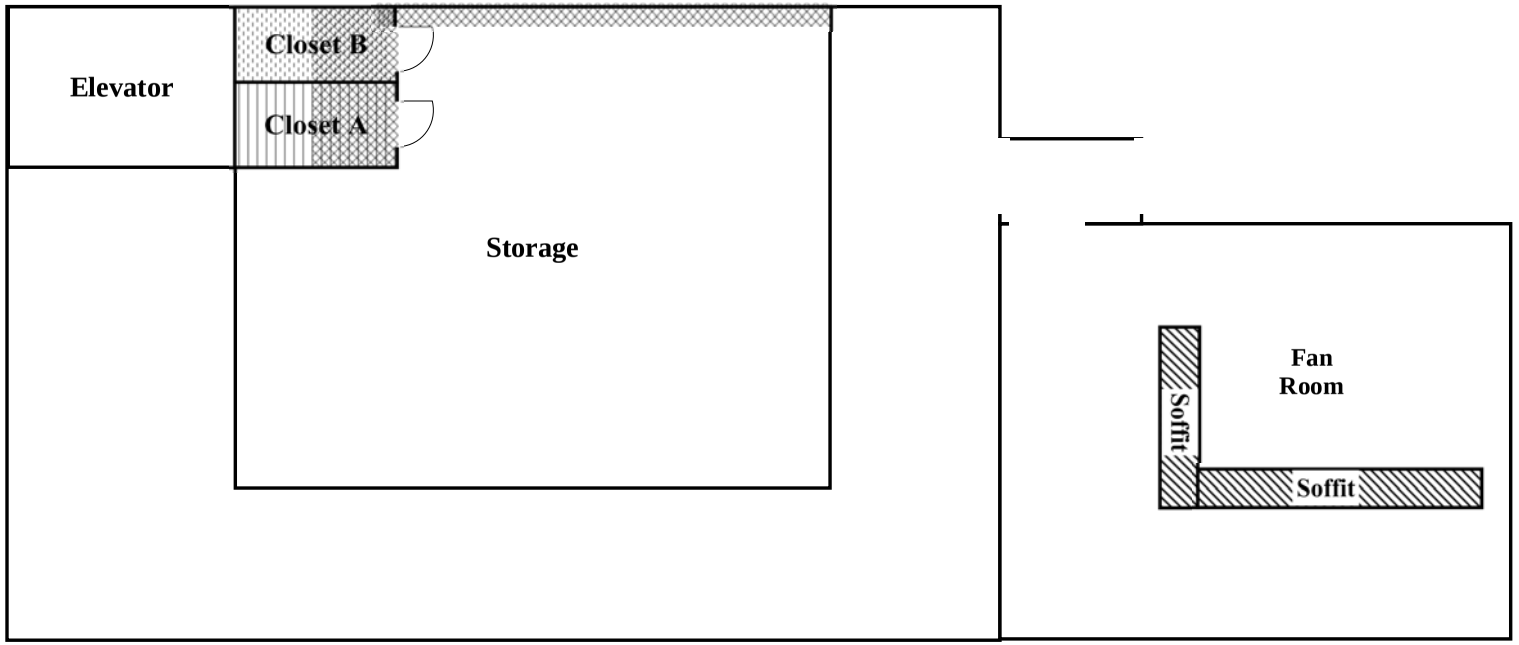
It should be noted that the information contained within this report is based solely upon site observations and the results of laboratory analysis for samples collected by **QuES&T.** These observations and results are time dependent, subject to changing site conditions and revisions to Federal, State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

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

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

Appendix A:
DRAWINGS & FLOOR PLANS

SUNY Purchase - Basement Floor



ACM LEGEND: (Please refer asbestos report for details)	
	Fan Room, Soffit, ACM Joint Compound
	Closet A & B Upper Wall Sheetrock, ACM Joint Compound & Closet A Soffit ACM Joint Compound
	Closet A, Wall, on Cementitious Block: ACM Black Residual Glue Dabs
	Closet B, Wall, on Cementitious Block: ACM Brown Residual Glue Dabs

N

Basement Floor Key Plan - ACM Locations

Drawing Not to Scale

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

SUNY Purchase Association
735 Anderson Hill Road
Purchase, NY 10577

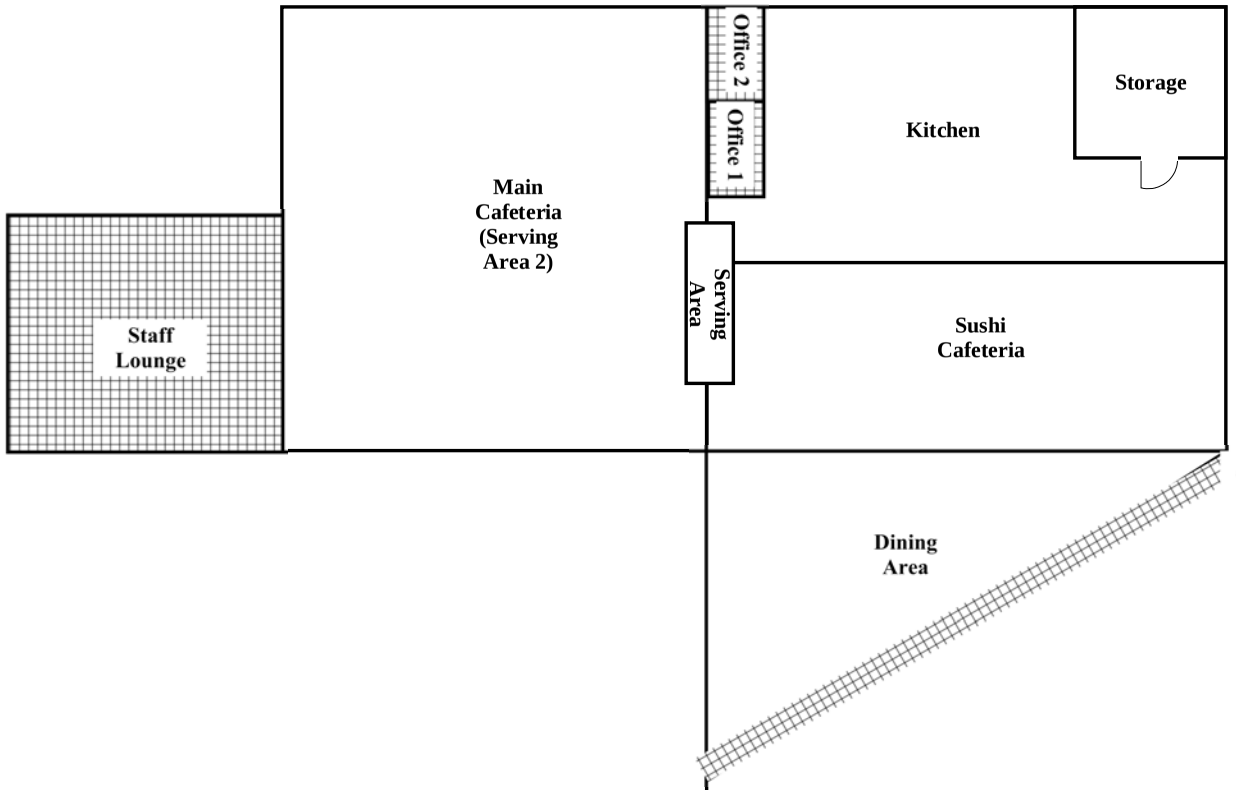
SUNY Purchase Cafe Building
735 Anderson Hill Road
Purchase, NY 10577

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

Date: 1/31/2018
Version # 1
Issued For: Pre-Reno Asbestos Survey
Project NO: Q18-1530
Project Manager: Larry Goldstein
Drawing Prepared By: Tanay Ranadive

ASB - 01

SUNY Purchase - Main Floor



N

Firstt Floor Key Plan - ACM Locations

ACM LEGEND: (Please refer asbestos report for details)
ACM Joint Compound on Sheetrock Wall

Drawing Not to Scale

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

SUNY Purchase Association
735 Anderson Hill Road
Purchase, NY 10577

SUNY Purchase
Cafe Building
735 Anderson Hill Road
Purchase, NY 10577

QuES&T
Quality Environmental Solutions & Technologies, Inc.
1376 Route 9
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Phone: (845) 298- 6031
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Date: 1/31/2018
Version # 1
Issued For: Pre-Reno Asbestos Survey
Project NO: Q18-1530
Project Manager: Larry Goldstein
Drawing Prepared By: Tanay Ranadive

ASB - 02

Appendix B:
SAMPLE RESULTS

EMSL Analytical, Inc.

307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031801391
Customer ID: QUES51
Customer PO:
Project ID:

Attention: Quality Environmental Solution & Tech
1376 Route 9
Wappingers Falls, NY 12590

Phone: (845) 298-6031
Fax: (845) 298-6251
Received Date: 01/19/2018 11:22 AM
Analysis Date: 01/24/2018
Collected Date: 01/17/2018

Project: Q18-1530 / CAFE RENOVATION

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos
Sample ID 1530-01		**Description**	BASEMENT FAN ROOM ON METAL PIPE AT ELBOW - MUDDED JOINT PACKING		
031801391-0001		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	30.00% Min. Wool	33.00% Ca Carbonate 37.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-02		**Description**	BASEMENT STORAGE ROOM ON METAL PIPE AT ELBOW - MUDDED JOINT PACKING		
031801391-0002		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	40.00% Min. Wool	25.00% Ca Carbonate 35.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-03		**Description**	BASEMENT STORAGE ROOM ON METAL PIPE AT ELBOW - MUDDED JOINT PACKING		
031801391-0003		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	15.00% Min. Wool	60.00% Gypsum 25.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-04		**Description**	BASEMENT FAN ROOM ON METAL SUPPORT COLUMN - SPRAYED ON FIREPROOFING		
031801391-0004		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	100.00% Non-fibrous (other) Vermiculite Present	
Surfacing Material containing vermiculite. NYS requires ELAP method 198.8.					
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-05		**Description**	BASEMENT STORAGE ROOM ON METAL SUPPORT COLUMN - SPRAYED ON FIREPROOFING		
031801391-0005		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	100.00% Non-fibrous (other) Vermiculite Present	
Surfacing Material containing vermiculite. NYS requires ELAP method 198.8.					
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial Report From: 01/24/2018 11:36:14

EMSL Analytical, Inc.
307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031801391
Customer ID: QUES51
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-06		**Description**	BASEMENT FAN ROOM ON METAL SUPPORT COLUMN - SPRAYED ON FIREPROOFING		
031801391-0006		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	100.00% Non-fibrous (other) Vermiculite Present	
Surfacing Material containing vermiculite. NYS requires ELAP method 198.8.					
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-07		**Description**	BASEMENT STORAGE ROOM ON METAL SUPPORT COLUMN - SPRAYED ON FIREPROOFING		
031801391-0007		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	40.00% Min. Wool	22.00% Ca Carbonate 38.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-08		**Description**	BASEMENT STORAGE ROOM ON METAL SUPPORT COLUMN - SPRAYED ON FIREPROOFING		
031801391-0008		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	40.00% Min. Wool	30.00% Ca Carbonate 30.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-09		**Description**	BASEMENT STORAGE ROOM ON METAL SUPPORT COLUMN - SPRAYED ON FIREPROOFING		
031801391-0009		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	35.00% Min. Wool	30.00% Ca Carbonate 35.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-10		**Description**	FIRST FLOOR KITCHEN STORAGE ROOM ON METAL SUPPORT COLUMNS - SPRAYED ON FIREPROOFING		
031801391-0010		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	42.00% Min. Wool	35.00% Ca Carbonate 23.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial Report From: 01/24/2018 11:36:14

EMSL Analytical, Inc.
307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031801391
Customer ID: QUES51
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos
Sample ID 1530-11		**Description**	FIRST FLOOR KITCHEN STORAGE ROOM ON METAL SUPPORT COLUMNS - SPRAYED ON FIREPROOFING		
031801391-0011		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	38.00% Min. Wool	30.00% Ca Carbonate 32.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-12		**Description**	FIRST FLOOR KITCHEN STORAGE ROOM ON METAL SUPPORT COLUMNS - SPRAYED ON FIREPROOFING		
031801391-0012		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	75.00% Min. Wool	20.00% Gypsum 5.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-13		**Description**	BASEMENT STORAGE ROOM PARTITION WALL ON SHEETROCK - JOINT COMPOUND		
031801391-0013		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray		53.00% Ca Carbonate 47.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-14		**Description**	BASEMENT STORAGE ROOM PARTITION WALL ON SHEETROCK - JOINT COMPOUND		
031801391-0014		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	White		60.00% Ca Carbonate 40.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-15		**Description**	BASEMENT HALLWAY OUTSIDE STORAGE ROOM PARTITION WALL ON SHEETROCK - JOINT COMPOUND		
031801391-0015		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	White		55.00% Ca Carbonate 45.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-16		**Description**	FIRST FLOOR CAFÉ SERVING AREA WALL ON SHEETROCK - JOINT COMPOUND		
031801391-0016		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	White		57.00% Ca Carbonate 43.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-17 *031801391-0017*		**Description**	FIRST FLOOR CAFÉ DINING ROOM WALL ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	48.00% Ca Carbonate 6.00% Mica 44.04% Non-fibrous (other)	**1.96% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-18 *031801391-0018*		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE WALL ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray/ White	None	40.00% Ca Carbonate 58.74% Non-fibrous (other)	**1.26% Chrysotile**
Result includes a small amount of inseparable attached material					
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-19 *031801391-0019*		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE WALL ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	46.00% Ca Carbonate 5.00% Mica 46.86% Non-fibrous (other)	**2.14% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-20 *031801391-0020*		**Description**	FIRST FLOOR CAFÉ KITCHEN OFFICE WALL ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	15.00% Mica 83.06% Non-fibrous (other)	**1.94% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-21 *031801391-0021*		**Description**	FIRST FLOOR CAFÉ MAIN SERVING AREA WALL ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	White		57.00% Ca Carbonate 43.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-22 *031801391-0022*		**Description**	BASEMENT CAFÉ FAN ROOM SOFFIT ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	58.00% Ca Carbonate 6.00% Mica 33.84% Non-fibrous (other)	**2.16% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-23 *031801391-0023*		**Description**	BASEMENT STORAGE ROOM CLOSET B WALL ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	55.00% Ca Carbonate 15.00% Mica 27.78% Non-fibrous (other)	**2.22% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-24 *031801391-0024*		**Description**	BASEMENT STORAGE ROOM CLOSET B WALL ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Tan	None	45.00% Ca Carbonate 15.00% Mica 37.62% Non-fibrous (other)	**2.38% Chrysotile**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-25 *031801391-0025*		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL - SHEETROCK		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	4.00% Cellulose	78.00% Gypsum 18.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-26 *031801391-0026*		**Description**	BASEMENT STORAGE ROOM CLOSET B WALL - SHEETROCK		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	5.00% Cellulose	77.00% Gypsum 18.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-27 *031801391-0027*		**Description**	FIRST FLOOR CAFÉ DINING ROOM SOFFIT - SHEETROCK		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray	4.00% Cellulose	80.00% Gypsum 16.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-28 *031801391-0028*		**Description** FIRST FLOOR CAFÉ MAIN SERVING AREA WALL - SHEETROCK **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray	15.00% Cellulose	65.00% Gypsum 20.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-29 *031801391-0029*		**Description** BASEMENT FAN ROOM AROUND DUCT - CANVAS WRAP **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray	60.00% Cellulose	40.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-30 *031801391-0030*		**Description** BASEMENT FAN ROOM AROUND DUCT - CANVAS WRAP **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray	92.00% Cellulose	8.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-31-Quarry Tile *031801391-0031*		**Description** FIRST FLOOR SERVING AREA FLOOR - QUARRY TILE & MUDSET (SEPARATE LAYERS) **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Red		90.00% Non-fibrous (other) 10.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-31-Mudset *031801391-0031A*		**Description** FIRST FLOOR SERVING AREA FLOOR - QUARRY TILE & MUDSET (SEPARATE LAYERS) **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		10.00% Ca Carbonate 78.00% Non-fibrous (other) 12.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-32-Quarry Tile *031801391-0032*		**Description** FIRST FLOOR SERVING AREA FLOOR - QUARRY TILE & MUDSET (SEPARATE LAYERS) **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Red		85.00% Non-fibrous (other) 15.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-32-Mudset *031801391-0032A*		**Description** FIRST FLOOR SERVING AREA FLOOR - QUARRY TILE & MUDSET (SEPARATE LAYERS) **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		30.00% Gypsum 25.00% Non-fibrous (other) 45.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-33 *031801391-0033*		**Description** FIRST FLOOR CAFÉ SERVING AREA BETWEEN QUARRY TILE - GROUT **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		34.00% Ca Carbonate 40.00% Non-fibrous (other) 26.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-34 *031801391-0034*		**Description** FIRST FLOOR CAFÉ SERVING AREA BETWEEN QUARRY TILE - GROUT **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		35.00% Gypsum 25.00% Non-fibrous (other) 40.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-35 *031801391-0035*		**Description** BASEMENT STORAGE ROOM CLOSET B WALL ON SHEETROCK - FIBERBOARD **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Brown	85.00% Cellulose	15.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-36 *031801391-0036*		**Description** BASEMENT STORAGE ROOM CLOSET B CEILING - FIBERBOARD **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Brown	96.00% Cellulose	4.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-37 *031801391-0037*		**Description** FIRST FLOOR CAFÉ MAIN SERVING AREA FLOOR LARGE TILE - CERAMIC TILE **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		95.00% Non-fibrous (other) 5.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-38 *031801391-0038*		**Description** FIRST FLOOR CAFÉ MAIN SERVING AREA FLOOR LARGE TILE - CERAMIC TILE **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Tan		85.00% Non-fibrous (other) 15.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-39 *031801391-0039*		**Description** FIRST FLOOR CAFÉ MAIN SERVING AREA FLOOR SMALL TILE - CERAMIC TILE **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Blue		98.00% Non-fibrous (other) 2.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-40 *031801391-0040*		**Description** FIRST FLOOR CAFÉ MAIN SERVING AREA FLOOR SMALL TILE - CERAMIC TILE **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Blue		75.00% Non-fibrous (other) 25.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-41 *031801391-0041*		**Description** BASEMENT STORAGE ROOM FLOOR - CEMENTITIOUS SLAB **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		35.00% Gypsum 25.00% Non-fibrous (other) 40.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-42 *031801391-0042*		**Description** FIRST FLOOR CAFÉ KITCHEN FLOOR UNDER EPOXY FLOORING - CEMENTITIOUS SLAB **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		30.00% Ca Carbonate 48.00% Non-fibrous (other) 22.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-43 *031801391-0043*		**Description** FIRST FLOOR CAFÉ KITCHEN WALL - CEMENTITIOUS BLOCK **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		40.00% Gypsum 25.00% Non-fibrous (other) 35.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-44 *031801391-0044*		**Description** BASEMENT STORAGE ROOM WALL - CEMENTITIOUS BLOCK **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		25.00% Ca Carbonate 39.00% Non-fibrous (other) 36.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-45 *031801391-0045*		**Description** BASEMENT FAN ROOM WALL BETWEEN CEMENTITIOUS BLOCK - MORTAR **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		25.00% Ca Carbonate 35.00% Non-fibrous (other) 40.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-46 *031801391-0046*		**Description** BASEMENT FAN ROOM WALL BETWEEN CEMENTITIOUS BLOCK - MORTAR **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		30.00% Ca Carbonate 30.00% Non-fibrous (other) 40.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-47 *031801391-0047*		**Description** FIRST FLOOR CAFÉ DINING AREA WALL BETWEEN BRICK - MORTAR **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		25.00% Ca Carbonate 37.00% Non-fibrous (other) 38.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-48 *031801391-0048*		**Description** FIRST FLOOR CAFÉ DINING AREA WALL BETWEEN BRICK - MORTAR **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Red		90.00% Non-fibrous (other) 10.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-49 *031801391-0049*		**Description** FIRST FLOOR CAFÉ DINING AREA WALL - BRICK **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray/ Red		86.00% Non-fibrous (other) 14.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-50 *031801391-0050*		**Description** FIRST FLOOR CAFÉ DINING AREA WALL - BRICK **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		75.00% Non-fibrous (other) 25.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-51 *031801391-0051*		**Description** FIRST FLOOR KITCHEN SUSPENDED CEILING SHEETROCK - CEILING TILE **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		80.00% Gypsum 20.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-52 *031801391-0052*		**Description** FIRST FLOOR KITCHEN SUSPENDED CEILING SHEETROCK - CEILING TILE **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Brown/ White	15.00% Cellulose 3.00% Glass	60.00% Gypsum 22.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-53 *031801391-0053*		**Description** FIRST FLOOR CAFÉ DINING AREA UNDER CERAMIC TILE ON CEMENTITIOUS SLAB - MUDSET **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	01/24/2018	Gray		28.00% Ca Carbonate 37.00% Gypsum 35.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

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Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-54		**Description**	FIRST FLOOR CAFÉ DINING AREA UNDER CERAMIC TILE ON CEMENTITIOUS SLAB - MUDSET		
031801391-0054		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray		40.00% Gypsum 25.00% Non-fibrous (other) 35.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-55		**Description**	FIRST FLOOR CAFÉ DINING AREA BETWEEN CERAMIC TILE - GROUT		
031801391-0055		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray		28.00% Ca Carbonate 40.00% Gypsum 32.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-56		**Description**	FIRST FLOOR CAFÉ DINING AREA BETWEEN CERAMIC TILE - GROUT		
031801391-0056		**Homogeneity**	Homogeneous		
PLM NYS 198.1 Friable	01/24/2018	Gray		35.00% Gypsum 25.00% Non-fibrous (other) 40.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial Report From: 01/24/2018 11:36:14

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307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order:	031801391
Customer ID:	QUES51
Customer PO:	
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods . The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	1/19/2018	Sample Receipt Time:	11:22 AM
Analysis Completed Date:	1/24/2018	Analysis Completed Time:	4:10 AM

Analyst(s):

Deen Liang PLM NYS 198.1 Friable (38)

Emily Myint PLM NYS 198.1 Friable (20)

Samples reviewed and approved by:

James Hall, Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.
All samples examined for the presence of vermiculite when analyzed via NYS 198.1.
-NYS Guidelines for Vermiculite containing samples are available at http ://www.wadsworth.org/labcert/elapcert/forms/ VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations . Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.
This report must not be used by the client to claim product certification , approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation .

Samples analyzed by EMSL Analytical, Inc. New York, NY NYS ELAP 11506

Initial Report From: 01/24/2018 11:36:14

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC. 031801391

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM** (EW) (KK)

TURN-AROUND TIME: _____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-01	Basement, Fan Room, on Metal Pipe, at Elbow	Mudded Joint Packing	**Stop**
1530-02	Basement, Storage Room, on Metal Pipe, at Elbow	Mudded Joint Packing	**At First**
1530-03	Basement, Storage Room, on Metal Pipe, at Elbow	Mudded Joint Packing	**Positive**
1530-04	Basement, Fan Room, on Metal Support Column	Sprayed-on Fireproofing	**Stop**
1530-05	Basement, Storage Room, on Metal Support Column	Sprayed-on Fireproofing	**At First**
1530-06	Basement, Fan Room, on Metal Support Column	Sprayed-on Fireproofing	**Positive**
1530-07	Basement, Storage Room, on Metal Support Column	Sprayed-on Fireproofing	**Stop**
1530-08	Basement, Storage Room, on Metal Support Column	Sprayed-on Fireproofing	**At First**
1530-09	Basement, Storage Room, on Metal Support Column	Sprayed-on Fireproofing	**Positive**
1530-10	First Floor, Kitchen Storage Room, on Metal Support Columns	Sprayed-on Fireproofing	**Stop**

18 JAN 9 AM 11:22

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

RECEIVED BY: _____ DATE: 1/19/18 11:22AM

Emily Myott 1.24.18 11:35A

PAGE__1__OF__6__

QC 1/24/18

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

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DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: ____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-11	First Floor, Kitchen Storage Room, on Metal Support Columns	Sprayed-on Fireproofing	**At First Positive**
1530-12	First Floor, Kitchen Storage Room, on Metal Support Columns	Sprayed-on Fireproofing	
1530-13	Basement, Storage Room, Partition Wall, on Sheetrock	Joint Compound	
1530-14	Basement, Storage Room, Partition Wall, on Sheetrock	Joint Compound	
1530-15	Basement, Hallway Outside Storage Room, Partition Wall, on Sheetrock	Joint Compound	
1530-16	First Floor, Café, Serving Area, Wall, on Sheetrock	Joint Compound	
1530-17	First Floor, Café, Dining Room, Wall, on Sheetrock	Joint Compound	
1530-18	First Floor, Café, Staff Lounge, Wall, on Sheetrock	Joint Compound	
1530-19	First Floor, Café, Staff Lounge, Wall, on Sheetrock	Joint Compound	
1530-20	First Floor, Café, Kitchen, Office, Wall, on Sheetrock	Joint Compound	

18 JAN 19 AM 11:25

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

RECEIVED BY: _____ DATE: 1/19/18 11:22 AM

Christy Nylund 1.24.18 11:35A

PAGE__2__OF__6__

or 1/24/18 BOSM

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

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DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: ____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-21	First Floor, Café, Main Serving Area, Wall, on Sheetrock	Joint Compound	
1530-22	Basement, Café, Fan Room, Soffit, on Sheetrock	Joint Compound	
1530-23	Basement, Storage Room, Closet B, Wall, on Sheetrock	Joint Compound	
1530-24	Basement, Storage Room, Closet B, Wall, on Sheetrock	Joint Compound	
1530-25	Basement, Storage Room, Closet A, Wall	Sheetrock	
1530-26	Basement, Storage Room, Closet B, Wall	Sheetrock	
1530-27	First Floor, Café, Dining Room, Soffit	Sheetrock	
1530-28	First Floor, Café, Main Serving Area, Wall	Sheetrock	18 JAN
1530-29	Basement, Fan Room, Around Duct	Canvas Wrap	**Stop ~~At~~ First Positive**
1530-30	Basement, Fan Room, Around Duct	Canvas Wrap	

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

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Emily Myint 1.24.18 11:35A

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OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

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CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: _____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-31	First Floor, Serving Area, Floor	Quarry Tile & Mudset (Separate Layers)	
1530-32	First Floor, Serving Area, Floor	Quarry Tile & Mudset (Separate Layers)	
1530-33	First Floor, Café, Serving Area, Between Quarry Tile	Grout	
1530-34	First Floor, Café, Serving Area, Between Quarry Tile	Grout	
1530-35	Basement, Storage Room, Closet B, Wall, on Sheetrock	Fiberboard	
1530-36	Basement, Storage Room, Closet B, Ceiling	Fiberboard	
1530-37	First Floor, Café, Main Serving Area, Floor, Large Tile	Ceramic Tile	
1530-38	First Floor, Café, Dining Area, Floor, Large Tile	Ceramic Tile	
1530-39	First Floor, Café, Main Serving Area, Floor, Small Tile	Ceramic Tile	
1530-40	First Floor, Café, Dining Area, Floor, Small Tile	Ceramic Tile	

18 JAN 19 AM 11:22

CHAIN OF CUSTODY (SEE LAST PAGE)

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OrderID: 031801391

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DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: ____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-41	Basement, Storage Room, Floor	Cementitious Slab	
1530-42	First Floor, Café, Kitchen, Floor, Under Epoxy Flooring	Cementitious Slab	
1530-43	First Floor, Café, Kitchen, Wall	Cementitious Block	
1530-44	Basement, Storage Room, Wall	Cementitious Block	
1530-45	Basement, Fan Room, Wall, Between Cementitious Block	Mortar	
1530-46	First Floor, Café, Kitchen, Wall, Between Cementitious Block	Mortar	
1530-47	First Floor, Café, Dining Area, Wall, Between Brick	Mortar	
1530-48	First Floor, Café, Dining Area, Wall, Between Brick	Mortar	
1530-49	First Floor, Café, Dining Area, Wall	Brick	
1530-50	First Floor, Café, Dining Area, Wall	Brick	

18 JAN 19 AM 11:22

CHAIN OF CUSTODY (SEE LAST PAGE)

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Emily Klemm 1-24-18 11:35AM

PAGE__5__OF__6__

1/24/18

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: _____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-51	First Floor, Kitchen, Suspended Ceiling, Sheetrock	Ceiling Tile	
1530-52	First Floor, Kitchen, Suspended Ceiling, Sheetrock	Ceiling Tile	
1530-53	First Floor, Café, Dining Area, Floor, Under Ceramic Tile, on Cementitious Slab	Mudset	
1530-54	First Floor, Café, Main Serving Area, Floor, Under Ceramic Tile, on Cementitious Slab	Mudset	
1530-55	First Floor, Café, Dining Area, Floor, Between Ceramic Tile	Grout	
1530-56	First Floor, Café, Main Serving Area, Floor, Between Ceramic Tile	Grout	

18 JAN 19 AM 11:22

CHAIN OF CUSTODY (SEE LAST PAGE)

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RECEIVED BY: _____ DATE: 1/19/18 11:22

Emily Myst 1.24.18 11:35A

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or 1/24/18 LOSA

OrderID: 031801391

FedEx

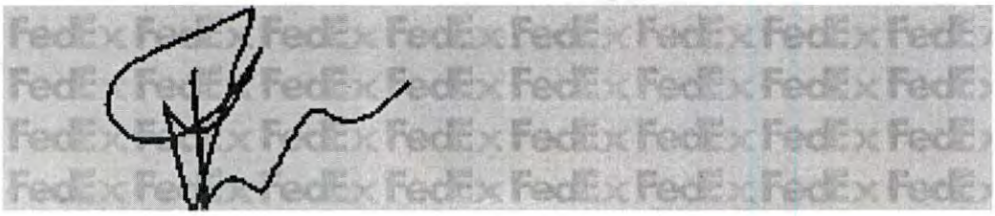
January 19,2018

Dear Customer:

The following is the proof-of-delivery for tracking number **795415506770**.

Delivery Information:

Status:	Delivered	**Delivered to:**	Receptionist/Front Desk
Signed for by:	M.MARCUS	**Delivery location:**	307 WEST 38TH ST RM 901 New York, NY 10018
Service type:	FedEx Priority Overnight	**Delivery date:**	Jan 19, 2018 10:53
Special Handling:	Deliver Weekday		



Shipping Information:

Tracking number:	795415506770	**Ship date:**	Jan 18, 2018
		Weight:	1.0 lbs/0.5 kg

Recipient:
Sample Receiving
EMSL Analytical, Inc.
307 West 38th Street
New York, NY 10018 US

Shipper:
Contact Name:
Quality Environmental Solution & Te
1376 Route 9
Wappingers Falls, NY 12590 US

Reference ARL-WEB(A)
RMA QUES51

Thank you for choosing FedEx.

EMSL Analytical, Inc.

307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031801394
Customer ID: QUES51
Customer PO:
Project ID:

Attention: Quality Environmental Solution & Tech
1376 Route 9
Wappingers Falls, NY 12590

Phone: (845) 298-6031
Fax: (845) 298-6251
Received Date: 01/19/2018 11:24 AM
Analysis Date: 01/22/2018 - 01/24/2018
Collected Date: 01/17/2018

Project: Q18-1530 / CAFE RENOVATION

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-57		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE SUSPENDED CEILING 2' X 2' DOT SPECK - CEILING TILE		
031801394-0001		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	White		100.00% Other	**None Detected**
Sample ID 1530-58		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE SUSPENDED CEILING 2' X 2' DOT SPECK - CEILING TILE		
031801394-0002		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	White		100.00% Other	**None Detected**
Sample ID 1530-59		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE SUSPENDED CEILING 2' X 4' DOT CANYON - CEILING TILE		
031801394-0003		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	White	1.40% Fibrous (other)	98.60% Other	**None Detected**
Sample ID 1530-60		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE SUSPENDED CEILING 2' X 4' DOT CANYON - CEILING TILE		
031801394-0004		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	White		100.00% Other	**None Detected**
Sample ID 1530-61		**Description**	FIRST FLOOR CAFÉ DINING ROOM CEILING 1' X 1' SPLINED CANYONED - CEILING TILE		
031801394-0005		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	White		100.00% Other	**None Detected**

Initial report from: 01/24/2018 07:22:05

EMSL Analytical, Inc.
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EMSL Order: 031801394
Customer ID: QUES51
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-62		**Description**	FIRST FLOOR CAFÉ DINING ROOM CEILING 1' X 1' SPLINED CANYONED - CEILING TILE		
031801394-0006		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	White		100.00% Other	**None Detected**
Sample ID 1530-63		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL ON CEMENTITIOUS BLOCK RESIDUAL BLACK - GLUE DAB		
031801394-0007		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black	None	95.90% Other	**4.10% Chrysotile**
TEM NYS 198.4 NOB	01/22/2018				**Positive Stop (Not Analyzed)**
Sample ID 1530-64		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL ON CEMENTITIOUS BLOCK RESIDUAL BLACK - GLUE DAB		
031801394-0008		**Homogeneity**			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018				**Positive Stop (Not Analyzed)**
TEM NYS 198.4 NOB	01/22/2018				**Positive Stop (Not Analyzed)**
Sample ID 1530-65		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL ON CEMENTITIOUS BLOCK RESIDUAL BLACK - GLUE DAB		
031801394-0009		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Brown		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Brown		100.00% Other	**None Detected**
Sample ID 1530-66		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL ON CEMENTITIOUS BLOCK RESIDUAL BLACK - GLUE DAB		
031801394-0010		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Brown		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Brown		100.00% Other	**None Detected**
Sample ID 1530-67		**Description**	BASEMENT STORAGE ROOM CLOSET B WALL ON CEMENTITIOUS BLOCK RESIDUAL BROWN - GLUE DAB		
031801394-0011		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Brown		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Brown		100.00% Other	**None Detected**

Initial report from: 01/24/2018 07:22:05

EMSL Analytical, Inc.
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http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031801394
Customer ID: QUES51
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-68		**Description**	BASEMENT STORAGE ROOM CLOSET B WALL ON CEMENTITIOUS BLOCK RESIDUAL BROWN - GLUE DAB		
031801394-0012		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Brown		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Brown	None	97.40% Other	**2.60% Chrysotile**
Sample ID 1530-69		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL ON CEMENTITIOUS BLOCK RESIDUAL GRAY - GLUE DAB		
031801394-0013		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Gray		100.00% Other	**None Detected**
Sample ID 1530-70		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL ON CEMENTITIOUS BLOCK RESIDUAL GRAY - GLUE DAB		
031801394-0014		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Gray		100.00% Other	**None Detected**
Sample ID 1530-71		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL ON SHEETROCK RESIDUAL - ADHESIVE		
031801394-0015		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Yellow		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Yellow		100.00% Other	**None Detected**
Sample ID 1530-72		**Description**	BASEMENT STORAGE ROOM CLOSET A WALL ON SHEETROCK RESIDUAL - ADHESIVE		
031801394-0016		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Yellow		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Yellow		100.00% Other	**None Detected**
Sample ID 1530-73-Cove Base		**Description**	FIRST FLOOR CAFÉ KITCHEN STORAGE ROOM WALL ON CEMENTITIOUS BLOCK - COVE BASE MOLDING & ADHESIVE (SEPARATE LAYERS)		
031801394-0017		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Gray		100.00% Other	**None Detected**

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EMSL Order: 031801394
Customer ID: QUES51
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-73-Mastic		**Description**	FIRST FLOOR CAFÉ KITCHEN STORAGE ROOM WALL ON CEMENTITIOUS BLOCK - COVE BASE MOLDING & ADHESIVE (SEPARATE LAYERS)		
031801394-0017A		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Yellow		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Yellow		100.00% Other	**None Detected**
Sample ID 1530-74-Cove Base		**Description**	FIRST FLOOR CAFÉ KITCHEN STORAGE ROOM WALL ON CEMENTITIOUS BLOCK - COVE BASE MOLDING & ADHESIVE (SEPARATE LAYERS)		
031801394-0018		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Gray		100.00% Other	**None Detected**
Sample ID 1530-74-Mastic		**Description**	FIRST FLOOR CAFÉ KITCHEN STORAGE ROOM WALL ON CEMENTITIOUS BLOCK - COVE BASE MOLDING & ADHESIVE (SEPARATE LAYERS)		
031801394-0018A		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Yellow		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Yellow		100.00% Other	**None Detected**
Sample ID 1530-75-Cove Base		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE WALL ON SHEETROCK - COVE BASE MOLDING & ADHESIVE (SEPARATE LAYERS)		
031801394-0019		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black		100.00% Other	**None Detected**
Sample ID 1530-75-Mastic		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE WALL ON SHEETROCK - COVE BASE MOLDING & ADHESIVE (SEPARATE LAYERS)		
031801394-0019A		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Yellow		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Yellow		100.00% Other	**None Detected**
Sample ID 1530-76-Cove Base		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE WALL ON SHEETROCK - COVE BASE MOLDING & ADHESIVE (SEPARATE LAYERS)		
031801394-0020		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black	None	100.00% Other	**<1.00% Chrysotile**

Initial report from: 01/24/2018 07:22:05

EMSL Analytical, Inc.
307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031801394
Customer ID: QUES51
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-76-Mastic		**Description**	FIRST FLOOR CAFÉ STAFF LOUNGE WALL ON SHEETROCK - COVE BASE MOLDING & ADHESIVE (SEPARATE LAYERS)		
031801394-0020A		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Yellow		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Yellow		100.00% Other	**None Detected**
Sample ID 1530-77		**Description**	FIRST FLOOR CAFÉ SERVING AREA ABOVE SUSPENDED CEILING ON METAL DUCTWORK AT SEAMS - SEALANT		
031801394-0021		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Gray		100.00% Other	**None Detected**
Sample ID 1530-78		**Description**	FIRST FLOOR CAFÉ SERVING AREA ABOVE SUSPENDED CEILING ON METAL DUCTWORK AT SEAMS - SEALANT		
031801394-0022		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Gray		100.00% Other	**None Detected**
Sample ID 1530-79		**Description**	FIRST FLOOR CAFÉ FLOOR 1' X 1' ON LEVELING COMPOUND - FLOOR TILE		
031801394-0023		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	White		100.00% Other	**None Detected**
Sample ID 1530-80		**Description**	FIRST FLOOR CAFÉ FLOOR 1' X 1' ON LEVELING COMPOUND - FLOOR TILE		
031801394-0024		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	White		100.00% Other	**None Detected**
Sample ID 1530-81-Leveling Compound		**Description**	FIRST FLOOR CAFÉ FLOOR UNDER 1' X 1' FLOOR TILE ON CEMENTITIOUS SLAB - LEVELING COMPOUND & MASTIC (SEPARATE LAYERS)		
031801394-0025		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable	01/24/2018	Brown		35.00% Gypsum 60.00% Non-fibrous (other) 5.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 01/24/2018 07:22:05

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307 West 38th Street New York, NY 10018
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http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031801394
Customer ID: QUES51
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-81-Mastic		**Description**	FIRST FLOOR CAFÉ FLOOR UNDER 1' X 1' FLOOR TILE ON CEMENTITIOUS SLAB - LEVELING COMPOUND & MASTIC (SEPARATE LAYERS)		
031801394-0025A		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black		100.00% Other	**None Detected**
Sample ID 1530-82-Leveling Compound		**Description**	FIRST FLOOR CAFÉ FLOOR UNDER 1' X 1' FLOOR TILE ON CEMENTITIOUS SLAB - LEVELING COMPOUND & MASTIC (SEPARATE LAYERS)		
031801394-0026		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable	01/24/2018	Brown		40.00% Gypsum 55.00% Non-fibrous (other) 5.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-82-Mastic		**Description**	FIRST FLOOR CAFÉ FLOOR UNDER 1' X 1' FLOOR TILE ON CEMENTITIOUS SLAB - LEVELING COMPOUND & MASTIC (SEPARATE LAYERS)		
031801394-0026A		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black		100.00% Other	**None Detected**
Sample ID 1530-83		**Description**	FIRST FLOOR CAFÉ KTICHEN FLOOR ON CEMENTITIOUS SLAB - EPOXY FLOORING		
031801394-0027		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Red		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Red		100.00% Other	**None Detected**
Sample ID 1530-84		**Description**	FIRST FLOOR CAFÉ KTICHEN FLOOR ON CEMEMTITIOUS SLAB - EPOXY FLOORING		
031801394-0028		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Red		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Red		100.00% Other	**None Detected**
Sample ID 1530-85		**Description**	EXTERIOR CAFÉ FAÇADE WINDOW SYSTEM BETWEEN METAL FRAME AND BRICK - CAULK		
031801394-0029		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black	None	100.00% Other	**<1.00% Chrysotile**

Initial report from: 01/24/2018 07:22:05

EMSL Analytical, Inc.
307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031801394
Customer ID: QUES51
Customer PO:
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-86		**Description**	EXTERIOR CAFÉ FAÇADE WINDOW SYSTEM BETWEEN METAL FRAME AND BRICK - CAULK		
031801394-0030		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black		100.00% Other	**None Detected**
Sample ID 1530-87		**Description**	EXTERIOR CAFÉ FAÇADE WINDOW SYSTEM GLASS BETWEEN METAL CASE - CAULK		
031801394-0031		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black		100.00% Other	**None Detected**
Sample ID 1530-88		**Description**	EXTERIOR CAFÉ FAÇADE WINDOW SYSTEM GLASS BETWEEN METAL CASE - CAULK		
031801394-0032		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black		100.00% Other	**None Detected**
Sample ID 1530-89		**Description**	EXTERIOR CAFÉ ON FOUNDATION - WATERPROOFING TAR		
031801394-0033		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black	None	92.00% Other	**8.00% Chrysotile**
TEM NYS 198.4 NOB	01/22/2018				**Positive Stop (Not Analyzed)**
Sample ID 1530-90		**Description**	EXTERIOR CAFÉ ON FOUNDATION - WATERPROOFING TAR		
031801394-0034		**Homogeneity**			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018				**Positive Stop (Not Analyzed)**
TEM NYS 198.4 NOB	01/22/2018				**Positive Stop (Not Analyzed)**
Sample ID 1530-91		**Description**	EXTERIOR CAFÉ UNDER WINDOW SYSTEM ON FOUNDATION - WEATHER STRIP		
031801394-0035		**Homogeneity**	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black		100.00% Other	**None Detected**

Initial report from: 01/24/2018 07:22:05

EMSL Analytical, Inc.

307 West 38th Street New York, NY 10018

Tel/Fax: (212) 290-0051 / (212) 290-0058

http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order:	031801394
Customer ID:	QUES51
Customer PO:	
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1530-92 *031801394-0036*		**Description**	EXTERIOR CAFÉ UNDER WINDOW SYSTEM ON FOUNDATION - WEATHER STRIP		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	01/22/2018	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	01/24/2018	Black		100.00% Other	**None Detected**

Initial report from: 01/24/2018 07:22:05

EMSL Analytical, Inc.
307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order:	031801394
Customer ID:	QUES51
Customer PO:	
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods . The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	1/19/2018	Sample Receipt Time:	11:24 AM
Analysis Completed Date:	1/22/2018	Analysis Completed Time:	4:02 PM

Analyst(s):

Yolanda Chow PLM NYS 198.1 Friable (2)

Kamel Alawawda PLM NYS 198.6 NOB (38)

Muhsin Parson TEM NYS 198.4 NOB (36)

Samples reviewed and approved by:

James Hall, Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non -asbestos containing.
All samples examined for the presence of vermiculite when analyzed via NYS 198.1.
-NYS Guidelines for Vermiculite containing samples are available at http ://www.wadsworth.org/labcert/elapcert/forms/ VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations . Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government . This report may contain data that is not covered by the NVLAP accreditation.

Samples analyzed by EMSL Analytical, Inc. New York, NY NYS ELAP 11506

Initial report from: 01/24/2018 07:22:05

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC. 031861394

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM/NOB/QTEM** (KA)

TURN-AROUND TIME: _____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-57	First Floor, Café, Staff Lounge, Suspended Ceiling, 2' x 2', Dot Speck	Ceiling Tile	**Stop At First Positive**
1530-58	First Floor, Café, Staff Lounge, Suspended Ceiling, 2' x 2', Dot Speck	Ceiling Tile	
1530-59	First Floor, Café, Staff Lounge, Suspended Ceiling, 2' x 4', Dot Canyon	Ceiling Tile	**Stop At First Positive**
1530-60	First Floor, Café, Staff Lounge, Suspended Ceiling, 2' x 4', Dot Canyon	Ceiling Tile	
1530-61	First Floor, Café, Dining Room, Ceiling, 1' x 1', Splined, Canyoned	Ceiling Tile	**Stop At First Positive**
1530-62	First Floor, Café, Dining Room, Ceiling, 1' x 1', Splined, Canyoned	Ceiling Tile	
1530-63	Basement, Storage Room, Closet A, Wall, on Cementitious Block, Residual, Black	Glue Dab	**Stop At First Positive**
1530-64	Basement, Storage Room, Closet A, Wall, on Cementitious Block, Residual, Black	Glue Dab	
1530-65	Basement, Storage Room, Closet A, Wall, on Cementitious Block, Residual, Brown	Glue Dab	**Stop At First Positive**
1530-66	Basement, Storage Room, Closet A, Wall, on Cementitious Block, Residual, Brown	Glue Dab	

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1/18/2018

RECEIVED BY: _____ DATE: 1/19/18 11:24AM

PAGE 1 OF 4

1/24/18 5:26PM

OrderID: 031801394

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

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

TURN-AROUND TIME: _____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-67	Basement, Storage Room, Closet B, Wall, on Cementitious Block, Residual, Brown	Glue Dab	**Stop At First Positive**
1530-68	Basement, Storage Room, Closet B, Wall, on Cementitious Block, Residual, Brown	Glue Dab	
1530-69	Basement, Storage Room, Closet A, Wall, on Cementitious Block, Residual, Gray	Glue Dab	**Stop At First Positive**
1530-70	Basement, Storage Room, Closet A, Wall, on Cementitious Block, Residual, Gray	Glue Dab	
1530-71	Basement, Storage Room, Closet A, Wall, on Sheetrock, Residual	Adhesive	**Stop At First Positive**
1530-72	Basement, Storage Room, Closet A, Wall, on Sheetrock, Residual	Adhesive	
1530-73	First Floor, Café, Kitchen Storage Room, Wall, on Cementitious Block	Cove Base Molding & Adhesive (Separete Layers)	**Stop At First Positive**
1530-74	First Floor, Café, Kitchen Storage Room, Wall, on Cementitious Block	Cove Base Molding & Adhesive (Separete Layers)	
1530-75	First Floor, Café, Staff Lounge, Wall, on Sheetrock	Cove Base Molding & Adhesive (Separete Layers)	**Stop At First Positive**
1530-76	First Floor, Café, Staff Lounge, Wall, on Sheetrock	Cove Base Molding & Adhesive (Separete Layers)	

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1/18/2018

RECEIVED BY: _____ DATE: 1/19/18 11:24AM

PAGE 2 OF 4

1/24/18 5:26 AM

OrderID: 031801394

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

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

TURN-AROUND TIME: ____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-77	First Floor, Café, Serving Area, Above Suspended Ceiling, on Metal Ductwork, at Seams	Sealant	**Stop At First Positive**
1530-78	First Floor, Café, Serving Area, Above Suspended Ceiling, on Metal Ductwork, at Seams	Sealant	
1530-79	First Floor, Café, Floor, 1' x 1', on Leveling Compound	Floor Tile	**Stop At First Positive**
1530-80	First Floor, Café, Floor, 1' x 1', on Leveling Compound	Floor Tile	
1530-81	First Floor, Café, Floor, Under 1' x 1' Floor Tile, on Cementitious Slab	Leveling Compound & Mastic (Separate Layers)	**Stop At First Positive**
1530-82	First Floor, Café, Floor, Under 1' x 1' Floor Tile, on Cementitious Slab	Leveling Compound & Mastic (Separate Layers)	
1530-83	First Floor, Café, Kitchen, Floor, on Cementitious Slab	Epoxy Flooring	**Stop At First Positive**
1530-84	First Floor, Café, Kitchen, Floor, on Cementitious Slab	Epoxy Flooring	
1530-85	Exterior, Café, Façade, Window System, Between Metal Frame and Brick	Caulk	**Stop At First Positive**
1530-86	Exterior, Café, Façade, Window System, Between Metal Frame and Brick	Caulk	

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1/18/2018

RECEIVED BY: _____ DATE: 1/19/18 11:24 AM

PAGE 3 OF 4

1/24/18 5:20 PM

OrderID: 031801394

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

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

TURN-AROUND TIME: ____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-87	Exterior, Café, Window System, Glass to Metal Case	Caulk	**Stop At First Positive**
1530-88	Exterior, Café, Window System, Glass to Metal Case	Caulk	
1530-89	Exterior, Café, on Foundation	Waterproofing Tar	**Stop At First Positive**
1530-90	Exterior, Café, on Foundation	Waterproofing Tar	
1530-91	Exterior, Café, Under Window System, on Foundation	Weather Strip	**Stop At First Positive**
1530-92	Exterior, Café, Under Window System, on Foundation	Weather Strip	

18 JAN 19 AM 11:21

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1/18/2018

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PAGE 4 OF 4

1/24/18 5:26AM

FedEx

January 19,2018

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Signed for by:	M.MARCUS	**Delivery location:**	307 WEST 38TH ST RM 901 New York, NY 10018
Service type:	FedEx Priority Overnight	**Delivery date:**	Jan 19, 2018 10:53
Special Handling:	Deliver Weekday		

Shipping Information:

Tracking number:	795415506770	**Ship date:**	Jan 18, 2018
		Weight:	1.0 lbs/0.5 kg

Recipient:
Sample Receiving
EMSL Analytical, Inc.
307 West 38th Street
New York, NY 10018 US

Shipper:
Contact Name:
Quality Environmental Solution & Te
1376 Route 9
Wappingers Falls, NY 12590 US

Reference ARL-WEB(A)
RMA QUES51

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307 West 38th Street, New York, NY 10018
Phone/Fax: (212)290-0051 / (212)290-0058
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EMSL Order #: **031801391**
Customer ID: **QUES51**
Customer PO: **Not Available**

Attn:
Quality Environmental Solution & Tech
1376 Route 9
Wappingers Falls, NY 12590

Phone: **845-298-6031**
Fax: **845-298-6251**

Project: **Q18-1530 / CAFE RENOVATION**

Date Collected: **01/17/2018**
Date Received: **01/19/2018**
Date Analyzed: **01/29/2018**

Report Date: 01/29/2018 *Revision:* R0

Asbestos Analysis of NYS ELAP Method 198.8
PLM Analysis for Asbestos in Bulk Surfacing Materials Containing Vermiculite

Lab Number	*Client Sample Identification*	Appearance	Percentage Matrix Material	Percentage non-Asbestos Fibers	Chrysotile Percentage	Amphibole Percentage	Total Percentage
031801391-0004	1530-04	Tan Non-Fibrous Homogeneous	100	0.0	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
031801391-0005	1530-05	Brown Non-Fibrous Homogeneous	100	0.0	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
031801391-0006	1530-06	Tan Non-Fibrous Homogeneous	100	0.0	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected

Report Date	Report Revision	Revision Comments
01/29/2018	R0	Initial Report

James Hall, Laboratory Manager

or other approved signatory

EMSL Analytical, Inc.
307 West 38th Street, New York, NY 10018
Phone/Fax: (212)290-0051 / (212)290-0058
http://www.EMSL.com manhattanlab@emsl.com

EMSL Order #: **031801391**
Customer ID: **QUES51**
Customer PO: **Not Available**

Asbestos Analysis of NYS ELAP Method 198.8
PLM Analysis for Asbestos in Bulk Surfacing Materials Containing Vermiculite

Bench Sheet

EMSL Sample ID 031801391-0004 **Crucible ID:**

	Analyst	Date
Gravimetric Prep	TT	1/25/2018
Chrysotile Analysis	JC	1/28/2018
Centrifugation Date	JC	1/28/2018
Amphibole Analysis	DC	1/29/2018

Stereoscopic			
Color	Tan	**Stereoscopic % Asbestos**	0
Texture	Non-Fibrous		
Homogeneity	Homogeneous	**Vermiculite Detected**	**Yes**

Initial Weights*	
Weight of Crucible	1.8252
Weight of Crucible and Sub Sample	5.1700
Weight of Sub-Sample	3.3448
Ashing	
Weight of Crucible & Ash	4.6424
Weight of Ash	2.8172
Weight Loss During Ashing	0.5276
Weight Percent Organic and Water	15.7737
Acid Treatment/ Flotation	
Weight of Dish for Floats	8.2814
Weight of Dish & Floats	8.4913
Weight of Floats	0.2099
Weight Percent Floats	6.2754
Weight of Dish & Filter for Residue	8.5806
Weight of Dish & Filter & Residue	9.5990
Weight of Residue	1.0184
Weight Loss During Acid/Flotation Treatment	1.5889
Weight Percent Acid-Soluble/Float Materials	47.5036
Weight Percent Residue	30.4473

Non-Asbestos Fiber	Optical Property	Visual %	Calc %
			0
			0

Chrysotile Identification Optical Properties — Temperature (C°): 23.3

⊥ RI	IIRI	Morphology	Sign	Pleochorism	Birefringence	Fiber Color	Extinction
							1
							1
							1
							1

Amphibole Identification Optical Properties — Temperature (C°): 23.7

⊥ RI	IIRI	Morphology	Sign	Pleochorism	Birefringence	Fiber Color	Extinction

PLM Examination of Residue (Chrysotile)	Analyzed	PTCT	Chrysotile	Non-Empty	PTCT:	Chrysotile	Non-Empty	Trace Detected?
Number of Occupied Points	400	Slide 1:	0	50	Slide 5:	0	50	☐ None
Number of Chrysotile Points	0	Slide 2:	0	50	Slide 6:	0	50	*Check box if yes*
Percent Chrysotile by PTCT	0.00	Slide 3:	0	50	Slide 7:	0	50	
(if greater than 1% no further analysis needed)	0.0000	Slide 4:	0	50	Slide 8:	0	50	

Heavy Liquid Centrifugation	
Weight of Dish & Filter & Balance of Residue (Post Chrysotile Analysis)	9.5540
Weight of Balance of Residue	0.9734
Weight of Dish & Filter for Centrifugate	8.3637
Weight of Dish & Filter & Centrifugate	8.4902
Weight of Centrifugate	0.1265
Weight Percent Centrifiugate	3.9568

PLM Examination of Centrifugate (Amphibole)	Analyzed	PTCT	Amphibole	Non-Empty	PTCT	Amphibole	Non-Empty	Trace Detected?
Number of Occupied Points	400	Slide 1:	0	50	Slide 5:	0	50	☐ None
Number of Amphibole Points	0	Slide 2:	0	50	Slide 6:	0	50	*Check box if yes*
Percent Amphibole by PTCT	0.00	Slide 3:	0	50	Slide 7:	0	50	
Percent Amphibole in Sample	0.0000	Slide 4:	0	50	Slide 8:	0	50	

Percent of Total Asbestos in Sample	**0.0000**

** All Weights in grams*

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EMSL Order #: **031801391**
Customer ID: **QUES51**
Customer PO: **Not Available**

Asbestos Analysis of NYS ELAP Method 198.8
PLM Analysis for Asbestos in Bulk Surfacing Materials Containing Vermiculite

Bench Sheet

EMSL Sample ID 031801391-0005 **Crucible ID:**

	Analyst	Date
Gravimetric Prep	TT	1/25/2018
Chrysotile Analysis	JC	1/28/2018
Centrifugation Date	JC	1/28/2018
Amphibole Analysis	DC	1/29/2018

Stereoscopic			
Color	Brown	**Stereoscopic % Asbestos**	0
Texture	Non-Fibrous		
Homogeneity	Homogeneous	**Vermiculite Detected**	**Yes**

Initial Weights*	
Weight of Crucible	1.8211
Weight of Crucible and Sub Sample	5.2488
Weight of Sub-Sample	3.4277
Ashing	
Weight of Crucible & Ash	4.7171
Weight of Ash	2.8960
Weight Loss During Ashing	0.5317
Weight Percent Organic and Water	15.5119
Acid Treatment/ Flotation	
Weight of Dish for Floats	8.1815
Weight of Dish & Floats	8.3226
Weight of Floats	0.1411
Weight Percent Floats	4.1165
Weight of Dish & Filter for Residue	8.8226
Weight of Dish & Filter & Residue	9.9239
Weight of Residue	1.1013
Weight Loss During Acid/Flotation Treatment	1.6536
Weight Percent Acid-Soluble/Float Materials	48.2423
Weight Percent Residue	32.1294

Non-Asbestos Fiber	Optical Property	Visual %	Calc %
			0
			0

Chrysotile Identification Optical Properties — Temperature (C°): 23.3

⊥ RI	IIRI	Morphology	Sign	Pleochorism	Birefringence	Fiber Color	Extinction
							1
							1
							1
							1

Amphibole Identification Optical Properties — Temperature (C°): 23.7

⊥ RI	IIRI	Morphology	Sign	Pleochorism	Birefringence	Fiber Color	Extinction

PLM Examination of Residue (Chrysotile)	Analyzed	PTCT	Chrysotile	Non-Empty	PTCT:	Chrysotile	Non-Empty	Trace Detected?
Number of Occupied Points	400	Slide 1:	0	50	Slide 5:	0	50	☐ None
Number of Chrysotile Points	0	Slide 2:	0	50	Slide 6:	0	50	*Check box if yes*
Percent Chrysotile by PTCT	0.00	Slide 3:	0	50	Slide 7:	0	50	
(if greater than 1% no further analysis needed)	0.0000	Slide 4:	0	50	Slide 8:	0	50	

Heavy Liquid Centrifugation	
Weight of Dish & Filter & Balance of Residue (Post Chrysotile Analysis)	9.8766
Weight of Balance of Residue	1.0540
Weight of Dish & Filter for Centrifugate	8.3607
Weight of Dish & Filter & Centrifugate	8.5036
Weight of Centrifugate	0.1429
Weight Percent Centrifiugate	4.3561

PLM Examination of Centrifugate (Amphibole)	Analyzed	PTCT	Amphibole	Non-Empty	PTCT	Amphibole	Non-Empty	Trace Detected?
Number of Occupied Points	400	Slide 1:	0	50	Slide 5:	0	50	☐ None
Number of Amphibole Points	0	Slide 2:	0	50	Slide 6:	0	50	*Check box if yes*
Percent Amphibole by PTCT	0.00	Slide 3:	0	50	Slide 7:	0	50	
Percent Amphibole in Sample	0.0000	Slide 4:	0	50	Slide 8:	0	50	

Percent of Total Asbestos in Sample	**0.0000**

** All Weights in grams*

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EMSL Order #: **031801391**
Customer ID: **QUES51**
Customer PO: **Not Available**

Asbestos Analysis of NYS ELAP Method 198.8
PLM Analysis for Asbestos in Bulk Surfacing Materials Containing Vermiculite

Bench Sheet

EMSL Sample ID 031801391-0006 **Crucible ID:**

	Analyst	Date
Gravimetric Prep	TT	1/25/2018
Chrysotile Analysis	JC	1/28/2018
Centrifugation Date	JC	1/28/2018
Amphibole Analysis	DC	1/29/2018

Stereoscopic			
Color	Tan	**Stereoscopic % Asbestos**	0
Texture	Non-Fibrous		
Homogeneity	Homogeneous	**Vermiculite Detected**	**Yes**

Initial Weights*	
Weight of Crucible	1.8220
Weight of Crucible and Sub Sample	5.2069
Weight of Sub-Sample	3.3849
Ashing	
Weight of Crucible & Ash	4.6656
Weight of Ash	2.8436
Weight Loss During Ashing	0.5413
Weight Percent Organic and Water	15.9916
Acid Treatment/ Flotation	
Weight of Dish for Floats	8.6936
Weight of Dish & Floats	8.7142
Weight of Floats	0.0206
Weight Percent Floats	0.6086
Weight of Dish & Filter for Residue	8.5828
Weight of Dish & Filter & Residue	9.7789
Weight of Residue	1.1961
Weight Loss During Acid/Flotation Treatment	1.6269
Weight Percent Acid-Soluble/Float Materials	48.0635
Weight Percent Residue	35.3363

Non-Asbestos Fiber	Optical Property	Visual %	Calc %
			0
			0

Chrysotile Identification Optical Properties — Temperature (C°): 23.3

⊥ RI	IIRI	Morphology	Sign	Pleochorism	Birefringence	Fiber Color	Extinction
							1
							1
							1
							1

Amphibole Identification Optical Properties — Temperature (C°): 23.7

⊥ RI	IIRI	Morphology	Sign	Pleochorism	Birefringence	Fiber Color	Extinction

PLM Examination of Residue (Chrysotile)	Analyzed	PTCT	Chrysotile	Non-Empty	PTCT:	Chrysotile	Non-Empty	Trace Detected?
Number of Occupied Points	400	Slide 1:	0	50	Slide 5:	0	50	☐ None
Number of Chrysotile Points	0	Slide 2:	0	50	Slide 6:	0	50	*Check box if yes*
Percent Chrysotile by PTCT	0.00	Slide 3:	0	50	Slide 7:	0	50	
(if greater than 1% no further analysis needed)	0.0000	Slide 4:	0	50	Slide 8:	0	50	

Heavy Liquid Centrifugation	
Weight of Dish & Filter & Balance of Residue (Post Chrysotile Analysis)	9.7093
Weight of Balance of Residue	1.1265
Weight of Dish & Filter for Centrifugate	8.6447
Weight of Dish & Filter & Centrifugate	8.8530
Weight of Centrifugate	0.2083
Weight Percent Centrifiugate	6.5340

PLM Examination of Centrifugate (Amphibole)	Analyzed	PTCT	Amphibole	Non-Empty	PTCT	Amphibole	Non-Empty	Trace Detected?
Number of Occupied Points	400	Slide 1:	0	50	Slide 5:	0	50	☐ None
Number of Amphibole Points	0	Slide 2:	0	50	Slide 6:	0	50	*Check box if yes*
Percent Amphibole by PTCT	0.00	Slide 3:	0	50	Slide 7:	0	50	
Percent Amphibole in Sample	0.0000	Slide 4:	0	50	Slide 8:	0	50	

Percent of Total Asbestos in Sample	**0.0000**

** All Weights in grams*

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http://www.EMSL.com manhattanlab@emsl.com

EMSL Order #:	**031801391**
Customer ID:	**QUES51**
Customer PO:	**Not Available**

Attn:
Quality Environmental Solution & Tech
1376 Route 9
Wappingers Falls, NY 12590

Phone: **845-298-6031**
Fax: **845-298-6251**

Project: **Q18-1530 / CAFE RENOVATION**

Date Collected: **01/17/2018**
Date Received **01/19/2018**
Date Analyzed: **01/29/2018**

Report Date	Report Revision	Revision Comments
01/29/2018	R0	Initial Report

James Hall, Laboratory Manager

or other approved signatory

Additional Comments: NYS ELAP ID #11506

About us

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OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC. 031801391

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM** (EW) (KK)

TURN-AROUND TIME: _____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-01	Basement, Fan Room, on Metal Pipe, at Elbow	Mudded Joint Packing	**Stop**
1530-02	Basement, Storage Room, on Metal Pipe, at Elbow	Mudded Joint Packing	**At First**
1530-03	Basement, Storage Room, on Metal Pipe, at Elbow	Mudded Joint Packing	**Positive**
1530-04	Basement, Fan Room, on Metal Support Column	Sprayed-on Fireproofing	**Stop**
1530-05	Basement, Storage Room, on Metal Support Column	Sprayed-on Fireproofing	**At First**
1530-06	Basement, Fan Room, on Metal Support Column	Sprayed-on Fireproofing	**Positive**
1530-07	Basement, Storage Room, on Metal Support Column	Sprayed-on Fireproofing	**Stop**
1530-08	Basement, Storage Room, on Metal Support Column	Sprayed-on Fireproofing	**At First**
1530-09	Basement, Storage Room, on Metal Support Column	Sprayed-on Fireproofing	**Positive**
1530-10	First Floor, Kitchen Storage Room, on Metal Support Columns	Sprayed-on Fireproofing	**Stop**

18 JAN 9 AM 11:22

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

RECEIVED BY: _____ DATE: 1/19/18 11:22AM

Emily Myott 1.24.18 11:35A

PAGE__1__OF__6__

QC 1/24/18

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: ____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-11	First Floor, Kitchen Storage Room, on Metal Support Columns	Sprayed-on Fireproofing	**At First Positive**
1530-12	First Floor, Kitchen Storage Room, on Metal Support Columns	Sprayed-on Fireproofing	
1530-13	Basement, Storage Room, Partition Wall, on Sheetrock	Joint Compound	
1530-14	Basement, Storage Room, Partition Wall, on Sheetrock	Joint Compound	
1530-15	Basement, Hallway Outside Storage Room, Partition Wall, on Sheetrock	Joint Compound	
1530-16	First Floor, Café, Serving Area, Wall, on Sheetrock	Joint Compound	
1530-17	First Floor, Café, Dining Room, Wall, on Sheetrock	Joint Compound	
1530-18	First Floor, Café, Staff Lounge, Wall, on Sheetrock	Joint Compound	
1530-19	First Floor, Café, Staff Lounge, Wall, on Sheetrock	Joint Compound	
1530-20	First Floor, Café, Kitchen, Office, Wall, on Sheetrock	Joint Compound	

18 JAN 19 AM 11:25

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

RECEIVED BY: _____ DATE: 1/19/18 11:22 AM

Christy Nylund 1.24.18 11:35A

PAGE__2__OF__6__

or 1/24/18 BOSM

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: ____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-21	First Floor, Café, Main Serving Area, Wall, on Sheetrock	Joint Compound	
1530-22	Basement, Café, Fan Room, Soffit, on Sheetrock	Joint Compound	
1530-23	Basement, Storage Room, Closet B, Wall, on Sheetrock	Joint Compound	
1530-24	Basement, Storage Room, Closet B, Wall, on Sheetrock	Joint Compound	
1530-25	Basement, Storage Room, Closet A, Wall	Sheetrock	
1530-26	Basement, Storage Room, Closet B, Wall	Sheetrock	
1530-27	First Floor, Café, Dining Room, Soffit	Sheetrock	
1530-28	First Floor, Café, Main Serving Area, Wall	Sheetrock	18 JAN
1530-29	Basement, Fan Room, Around Duct	Canvas Wrap	**Stop ~~At~~ First Positive**
1530-30	Basement, Fan Room, Around Duct	Canvas Wrap	

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

RECEIVED BY: _____ DATE: 1/19/18 11:22AM

Emily Myint 1.24.18 11:35A

PAGE 3 OF 6

dr 1/24/18 605A

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: _____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-31	First Floor, Serving Area, Floor	Quarry Tile & Mudset (Separate Layers)	
1530-32	First Floor, Serving Area, Floor	Quarry Tile & Mudset (Separate Layers)	
1530-33	First Floor, Café, Serving Area, Between Quarry Tile	Grout	
1530-34	First Floor, Café, Serving Area, Between Quarry Tile	Grout	
1530-35	Basement, Storage Room, Closet B, Wall, on Sheetrock	Fiberboard	
1530-36	Basement, Storage Room, Closet B, Ceiling	Fiberboard	
1530-37	First Floor, Café, Main Serving Area, Floor, Large Tile	Ceramic Tile	
1530-38	First Floor, Café, Dining Area, Floor, Large Tile	Ceramic Tile	
1530-39	First Floor, Café, Main Serving Area, Floor, Small Tile	Ceramic Tile	
1530-40	First Floor, Café, Dining Area, Floor, Small Tile	Ceramic Tile	

18 JAN 19 AM 11:22

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

RECEIVED BY: _____ DATE: 1/19/18 11:22AM

Emily Myhut 1.24.18 11:35AM

PAGE 4 OF 6

dc 1/24/18

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: ____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-41	Basement, Storage Room, Floor	Cementitious Slab	
1530-42	First Floor, Café, Kitchen, Floor, Under Epoxy Flooring	Cementitious Slab	
1530-43	First Floor, Café, Kitchen, Wall	Cementitious Block	
1530-44	Basement, Storage Room, Wall	Cementitious Block	
1530-45	Basement, Fan Room, Wall, Between Cementitious Block	Mortar	
1530-46	First Floor, Café, Kitchen, Wall, Between Cementitious Block	Mortar	
1530-47	First Floor, Café, Dining Area, Wall, Between Brick	Mortar	
1530-48	First Floor, Café, Dining Area, Wall, Between Brick	Mortar	
1530-49	First Floor, Café, Dining Area, Wall	Brick	
1530-50	First Floor, Café, Dining Area, Wall	Brick	

18 JAN 19 AM 11:22

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

RECEIVED BY: _____ DATE: 1/19/18 11:22AM

Emily Klemm 1-24-18 11:35AM

PAGE__5__OF__6__

1/24/18

OrderID: 031801391

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: **SUNY Purchase Assocation**

ADDRESS: **735 Anderson Hill Road**
Purchase, NY 10577

CONTACT: **Patrick Savolski**

PROJECT ID: **Café Renovation**

PROJECT # : **Q18-1530**

SAMPLED BY: **J. Klemm, S. Talsma**

DATE SAMPLED: **17-Jan-18**

ANALYSIS METHOD: **PLM**

TURN-AROUND TIME: _____ HOURS
5 DAYS
OTHER

SAMPLE # LAB#	*LOCATION*	*SAMPLE DESCRIPTION*	*COMMENTS*
1530-51	First Floor, Kitchen, Suspended Ceiling, Sheetrock	Ceiling Tile	
1530-52	First Floor, Kitchen, Suspended Ceiling, Sheetrock	Ceiling Tile	
1530-53	First Floor, Café, Dining Area, Floor, Under Ceramic Tile, on Cementitious Slab	Mudset	
1530-54	First Floor, Café, Main Serving Area, Floor, Under Ceramic Tile, on Cementitious Slab	Mudset	
1530-55	First Floor, Café, Dining Area, Floor, Between Ceramic Tile	Grout	
1530-56	First Floor, Café, Main Serving Area, Floor, Between Ceramic Tile	Grout	

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CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 1-18-18

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Emily Myst 1.24.18 11:35A

PAGE 6 OF 6

or 1/24/18 LOSA

OrderID: 031801391

FedEx

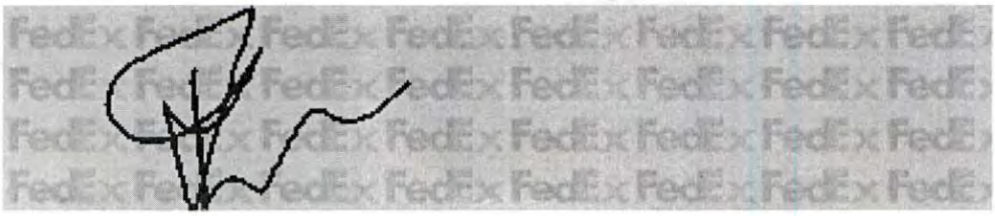
January 19,2018

Dear Customer:

The following is the proof-of-delivery for tracking number **795415506770**.

Delivery Information:

Status:	Delivered	**Delivered to:**	Receptionist/Front Desk
Signed for by:	M.MARCUS	**Delivery location:**	307 WEST 38TH ST RM 901 New York, NY 10018
Service type:	FedEx Priority Overnight	**Delivery date:**	Jan 19, 2018 10:53
Special Handling:	Deliver Weekday		



Shipping Information:

Tracking number:	795415506770	**Ship date:**	Jan 18, 2018
		Weight:	1.0 lbs/0.5 kg

Recipient:
Sample Receiving
EMSL Analytical, Inc.
307 West 38th Street
New York, NY 10018 US

Shipper:
Contact Name:
Quality Environmental Solution & Te
1376 Route 9
Wappingers Falls, NY 12590 US

Reference ARL-WEB(A)
RMA QUES51

Thank you for choosing FedEx.

EMSL Analytical, Inc.

307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order: 031802743
Customer ID: QUES51
Customer PO:
Project ID:

Attention: Quality Environmental Solution & Tech
1376 Route 9
Wappingers Falls, NY 12590

Phone: (845) 298-6031
Fax: (845) 298-6251
Received Date: 02/05/2018 10:03 AM
Analysis Date: 02/07/2018
Collected Date: 02/02/2018

Project: Q18-1530/ 735 ANDERSON HILL ROAD, SUNY PURCHASE, NY 10577/ CAFE RENOV.

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos: Fibrous	Non-Asbestos: Non-Fibrous	Asbestos
Sample ID 1530-01 *031802743-0001*		**Description**	MAIN AREA, WALL, ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	02/07/2018	White/ Green		55.00% Ca Carbonate 3.00% Mica 42.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-02 *031802743-0002*		**Description**	MAIN AREA, WALL, ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	02/07/2018	Gray/ White		50.00% Ca Carbonate 5.00% Mica 45.00% Non-fibrous (other)	**None Detected**
Inseparable paint / coating layer included in analysis					
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1530-03 *031802743-0003*		**Description**	MAIN AREA, WALL, ON SHEETROCK - JOINT COMPOUND		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	02/07/2018	White		60.00% Ca Carbonate 5.00% Mica 35.00% Non-fibrous (other)	**None Detected**
Inseparable paint / coating layer included in analysis					
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial Report From: 02/07/2018 13:03:19

EMSL Analytical, Inc.

307 West 38th Street New York, NY 10018
Tel/Fax: (212) 290-0051 / (212) 290-0058
http://www.EMSL.com / manhattanlab@emsl.com

EMSL Order:	031802743
Customer ID:	QUES51
Customer PO:	
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods . The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	2/5/2018	Sample Receipt Time:	10:03 AM
Analysis Completed Date:	2/7/2018	Analysis Completed Time:	12:32 PM

Analyst(s):

Emily Myint PLM NYS 198.1 Friable (1)

Jon Williams PLM NYS 198.1 Friable (2)

Samples reviewed and approved by:

James Hall, Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.
All samples examined for the presence of vermiculite when analyzed via NYS 198.1.
-NYS Guidelines for Vermiculite containing samples are available at http ://www.wadsworth.org/labcert/elapcert/forms/ VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations . Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.
This report must not be used by the client to claim product certification , approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation .

Samples analyzed by EMSL Analytical, Inc. New York, NY NYS ELAP 11506

Initial Report From: 02/07/2018 13:03:19

OrderID: 031802743

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

BULK SAMPLE FORM

CLIENT: SUNY Purchase Assocation

ADDRESS: 735 Anderson Hill Road

Purchase, NY 10577

CONTACT: Patrick Savolski

PROJECT ID: Café Renovation

PROJECT # : Q18-1530

SAMPLED BY: J. Klemm, L. Goldstein

DATE SAMPLED: 2-Feb-18

ANALYSIS METHOD: PLM LEM

TURN-AROUND TIME: _____ HOURS

5 DAYS

OTHER

031802743

SAMPLE # LAB#	LOCATION	SAMPLE DESCRIPTION	COMMENTS
1530-01	Main Area, Wall, on Sheetrock	Joint Compound	
1530-02	Main Area, Wall, on Sheetrock	Joint Compound	
1530-03	Main Area, Wall, on Sheetrock	Joint Compound	

RECEIVED 18 FEB -5 AM 10:03

2/7/18 1230

CHAIN OF CUSTODY (SEE LAST PAGE)

SUBMITTED BY: _____ DATE: 2-2-18

RECEIVED BY: Demoy B DATE: 2/05/18 @ 1003Am

PAGE 1 OF 1

Emily Mast 2.7.18 13:02

Revised chain of Custody
Ø 31802743

Holowitz, David

From: Silverman, Josh
Sent: Wednesday, February 07, 2018 11:32 AM
To: EMSL Lab - Manhattan; Manhattan Login; Hall, James
Subject: RE: 031802743 for QUES51

Importance: High

This is OK'd. Please charge 2 day TAT and have it done by 3pm today

Josh Silverman | *Sales Account Representative*
EMSL Analytical, Inc. | 200 Route 130 North | Cinnaminson, NJ 08077
Phone: 856-303-2531 Cell: 609-519-0143 | Fax: 856-786-5974 | Toll Free: 800-220-3675

From: Silverman, Josh
Sent: Wednesday, February 07, 2018 11:07 AM
To: EMSL Lab - Manhattan; Manhattan Login; Hall, James
Subject: RE: 031802743 for QUES51
Importance: High

2/7/18

No, they need done today, which would make it 2 day TAT. He needs them in the next couple hours.

031802743	February 05, 2018 10:03 AM	Q18-1530/ 735 ANDERSON HILL ROAD, URCHASE, NY 10577/ CAFE RENOV.	PLM NYS 198.1 Friable (3)	**N/A**	**Pending Due 02/10**	**Pending**	PDF	**Pend**

and change from SUNY URCHASE. Should read SUNY PURCHASE

please email the results to lgoldstein@qualityenv.com

Josh Silverman | *Sales Account Representative*
EMSL Analytical, Inc. | 200 Route 130 North | Cinnaminson, NJ 08077
Phone: 856-303-2531 Cell: 609-519-0143 | Fax: 856-786-5974 | Toll Free: 800-220-3675

Some of the resources EMSL Analytical, Inc. offers to our clients:
LABConnect | Order Products | Client Corner | Training | Additional Resources | Sampling Videos

---

David Holowitz 2/7/18 11:32 AM

031802743 Revised Chain of Custody

From: Holowitz, David **On Behalf Of** EMSL Lab - Manhattan
Sent: Wednesday, February 07, 2018 10:58 AM
To: Silverman, Josh; Manhattan Login; EMSL Lab - Manhattan; Hall, James
Subject: RE: 031802743 for QUES51

Should we change the turnaround to 3 Hours from the original 5 Day?

David Holowitz | *Admin/ Data Entry*
EMSL Analytical, Inc. | 307 West 38th Street | New York, NY 10018
Phone: 212-290-0051 | Fax: 212-290-0058 | Toll Free: 866-448-3675
Lab Hours: 24 Hours 7 Days a week

From: Silverman, Josh
Sent: Wednesday, February 07, 2018 10:55 AM
To: Manhattan Login; EMSL Lab - Manhattan; Hall, James
Subject: 031802743 for QUES51
Importance: High

Larry Goldstein at QUES51 just called in: 031802743 says SUNY URCHASE. Should read SUNY PURCHASE. He needs today, please change TAT to finish today

Josh Silverman | *Sales Account Representative*
EMSL Analytical, Inc. | 200 Route 130 North | Cinnaminson, NJ 08077
Phone: 856-303-2531 Cell: 609-519-0143 | Fax: 856-786-5974 | Toll Free: 800-220-3675

David Holowitz 2/7/18 11:32 AM

FedEx® Tracking

795423611369

Ship date:		Actual delivery:
Fri 2/02/2018	**Delivered**	**Mon 2/05/2018 9:34 am**
Wappingers Falls, NY US	*Signed for by: G.BATSON*	NEW YORK, NY US

Ex.

▲ Date/Time	Activity	Location
▪ 2/05/2018 - Monday		
9:34 am	Delivered	New York, NY
7:28 am	On FedEx vehicle for delivery	NEW YORK, NY
7:20 am	At local FedEx facility	NEW YORK, NY
▪ 2/04/2018 - Sunday		
1:36 am	Departed FedEx location	NEWARK, NJ
▪ 2/02/2018 - Friday		
10:58 pm	Arrived at FedEx location	NEWARK, NJ
9:20 pm	Left FedEx origin facility	NEWBURGH, NY
6:37 pm	Picked up	NEWBURGH, NY
12:48 pm	Shipment information sent to FedEx	

Shipment Facts

Tracking Number	795423611369	**Service**	FedEx Priority Overnight
Weight	1 lbs / 0.45 kgs	**Dimensions**	11x9x4 in.
Delivered To	Receptionist/Front Desk	**Total pieces**	1
Total shipment weight	1 lbs / 0.45 kgs	**Terms**	Shipper
RMA	QUES51	**Shipper reference**	ARL-WEB(A)
Packaging	Your Packaging	**Special handling section**	Deliver Weekday
Standard transit	2/05/2018 by 10:30 am		

Appendix C:
PERSONNEL LICENSES & CERTIFICATIONS

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

ASBESTOS HANDLING LICENSE

Quality Environmental Solutions & Technologies, Inc.

1376 Route 9

Wappinger Falls, NY 12590

FILE NUMBER: 99-0018
LICENSE NUMBER: 29085
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 01/18/2018
EXPIRATION DATE: 01/31/2019

Duly Authorized Representative – Lawrence J Holzapfel:

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

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

Eileen M. Franko, Director
For the Commissioner of Labor

SH 432 (8/12)

NEW YORK STATE

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

CERTIFICATION

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

Minority Business Enterprise (MBE)

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

Quality Environmental Solutions & Technologies Inc.

Certification Awarded on: August 11, 2015
Expiration Date: August 11, 2018
File ID#: 49952

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

A Division of Empire State Development

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

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

NY Lab Id No: 10851

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

Miscellaneous

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

Sample Preparation Methods

EPA 3050B

Serial No.: 55796

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

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

NY Lab Id No: 10851

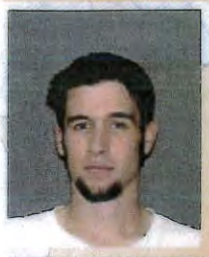
is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved subcategories and/or analytes are listed below:

Metals I	
Lead, Total	NIOSH 7082
Miscellaneous	
Asbestos	40 CFR 763 APX A No. III
	YAMATE,AGARWAL GIBB
	NIOSH 7402
Fibers	NIOSH 7400 A RULES

Serial No.: 55798

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S



JAMES D KLEMM
CLASS(EXPIRES)
C ATEC(06/18) D INSP(06/18)
H PM (06/18)

CERT# 13-11486
DMV# 949876493

MUST BE CARRIED ON ASBESTOS PROJECTS

01213 004335628 63

EYES BLU
HAIR BRO
HGT 5' 10"

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

SHA Occupational Safety and Health Administration

12-004336042

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

Construction Safety and Health

JAMES KLEMM

David Veit	06/05/2013
ner name – print or type)	(Course end date)

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

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

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

Rev. 9/2009

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S

SHANNON D TALSMA
CLASS(EXPIRES)
C ATEC(10/18) D INSP(10/18)
H PM (10/18)

CERT# 16-07559
DMV# 963348232

MUST BE CARRIED ON ASBESTOS PROJECTS

01213 00442712376

EYES GRN
HAIR BLN
HGT 6' 00"

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

OSHA
Occupational Safety and Health Administration

12-006010504

This card acknowledges that the recipient has successfully completed:

10-hour Construction Safety and Health

This card issued to:

Shannon D. Talsma

David Veit — Trainer Name

04/22/2016 — Date of Issue

Atlantic OSHA Training Center
An Authorized OSHA Training Institute Education Center

732.235.9450
aotc.sph.rutgers.edu

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

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

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

Rev. 1/2016

QuES&T

Quality Environmental Solutions & Technologies, Inc.

February 7th, 2018

SUNY Purchase Association
735 Anderson Hill Road
Purchase, NY 10577

ATTN: Patrick Savolskis

Via E-mail: patrick.savolskis@purchase.edu
Re: SUNY Purchase Cafe Building Renovation
735 Anderson Hill Road, Purchase, NY 10577
Limited XRF Lead Survey
QuES&T Project #Q18-1530

Dear Mr. Savolskis,

Quality **E**nvironmental **S**olutions **& T**echnologies, Inc. **(QuES&T)** was retained by SUNY Purchase Association to complete a limited Lead-Based Paint Survey, utilizing X-Ray Fluorescence Technology (XRF), throughout the interiors of the SUNY Purchase Campus Cafe North Building located at 735 Anderson Hill Road, Purchase, NY 10577. The survey was limited to specific accessible, representative building components & immovable objects, potentially affected by possible future renovation/repair/demolition activities.

Niton-certified XRF Technician Mr. James Klemm, of **QuES&T**, collected a total of forty four **(44)** samples (including calibrations) on January 16, 2018.

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

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

Campus North Café Building - INTERIORS:

Location of Identified LBP	LBP Component	Substrate	Color	LBP Condition	Approx. Qty.
Campus Café North, Main Cafeteria	Ceiling, Support Frame	Metal	Red	Intact	1,600SF
Campus Café North, Kitchen Storage	Ceiling, Support Beam	Metal	Red	Intact	400 SF
Campus Café North, Kitchen	Ceiling, Support Beam	Metal	Red	Intact	1,500 SF
Campus Café North, Basement, Fan Room	Ceiling, Support Beam	Metal	Red	Intact	350 SF

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

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

It should be noted that the information contained within this report is based upon observation and test results provided by **QuES&T.** These observations and results are time dependent, subject to changing site conditions and revisions to Federal, State, and Local regulations. **QuES&T** warrants that these findings have been promulgated after being prepared in general accordance with generally accepted practices in the abatement industries. **QuES&T** also recognizes that raw testing data is not usually sufficient to make all abatement and management decisions. No other warranties are expressed or implied.

Should you wish to discuss this matter further or require additional information concerning this transmittal, feel free to contact us at (845) 298-6031. **QuES&T** greatly appreciates the opportunity to assist SUNY Purchase Association in the environmental services area and we look forward to working again with you in the future.

Sincerely,

James Klemm
Field & Technical Services
NYS/AHERA Inspector
Cert. 13-11486

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

Appendix A:
ANALYTICAL DATA

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

Limited XRF Lead Survey

SUNY Purchase Association
735 Anderson Hill Road
Purchase, NY 10577
QuES&T Project #Q18-1530

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	***Sample***	***Building/Address***	***Interior/Exterior***	***Floor***	***Space/Room/Description***	***Object***	***Component***	***Substrate***	***Color***	***Condition***	***Result***	***Pb Concentration***	***Pb Error***
2												*(mg/cm2)*	*(mg/cm2)*
3	1	NIST (<0.01)									Negative	0	0.02
4	2	***NIST (1.04 +/- 0.06)***									***Positive***	***1.2***	***0.1***
5	3	Campus Café North	Interior	1st	Dining Hall	Wall		Sheetrock	Gray	Intact	Negative	0	0.02
6	4	Campus Café North	Interior	1st	Dining Hall	Wall		Brick	Brown	Intact	Negative	0	0.02
7	5	Campus Café North	Interior	1st	Dining Hall	Window	Casing	Metal	Black	Intact	Negative	0	0.02
8	6	Campus Café North	Interior	1st	Dining Hall	Door		Metal	Black	Intact	Negative	0	0.02
9	7	Campus Café North	Interior	1st	Dining Hall	Door	Casing	Metal	Black	Intact	Negative	0	0.02
10	8	Campus Café North	Interior	1st	Dining Hall	Column		Concrete	Gray	Intact	Negative	0.04	0.05
11	9	Campus Café North	Interior	1st	Sushi Serving Area	Wall	Lower	Sheetrock	Gray	Intact	Negative	0	0.02
12	10	Campus Café North	Interior	1st	Sushi Serving Area	Wall	Mid-Rail	Wood	Gray	Intact	Negative	0	0.02
13	11	Campus Café North	Interior	1st	Sushi Serving Area	Wall	Covebase Molding	Quarry Tile	Blue	Intact	Negative	0.05	0.07
14	12	Campus Café North	Interior	1st	Sushi Serving Area	Wall	Upper	Sheetrock	Black	Intact	Negative	0	0.02
15	13	Campus Café North	Interior	1st	Sushi Serving Area	Ceiling	Support Beam	Metal	Black	Intact	Negative	0	0.02
16	14	Campus Café North	Interior	1st	Sushi Serving Area	Ceiling	Deck	Metal	Black	Intact	Negative	0	0.02
17	15	Campus Café North	Interior	1st	Sushi Serving Area	Wall	Electric Panel	Metal	Gray	Intact	Negative	0	0.02
18	16	Campus Café North	Interior	1st	Sushi Serving Area	Door		Metal	Gray	Intact	Negative	0	0.02
19	17	Campus Café North	Interior	1st	Sushi Serving Area	Door	Casing	Metal	Gray	Intact	Negative	0	0.02
20	18	Campus Café North	Interior	1st	Sushi Serving Area	Security Gate	Casing	Metal	Black	Intact	Negative	0	0.02
21	19	Campus Café North	Interior	1st	Serving Area 2	Wall		Sheetrock	Gray	Intact	Negative	0	0.02
22	20	Campus Café North	Interior	1st	Serving Area 2	Ceiling	Soffit	Sheetrock	Gray	Intact	Negative	0.06	0.18
23	21	Campus Café North	Interior	1st	Serving Area 2	Emergency Door		Metal	Gray	Intact	Negative	0.14	0.79
24	22	Campus Café North	Interior	1st	Serving Area 2	Emergency Door	Casing	Metal	Gray	Intact	Negative	0.03	0.16
25	23	Campus Café North	Interior	1st	Serving Area 2	Ceiling	Duct	Metal	Blue	Intact	Negative	0.03	0.16
26	***24***	***Campus Café North***	***Interior***	***1st***	***Serving Area 2***	***Ceiling***	***Support Frame***	***Metal***	***Red***	***Intact***	***Positive***	***3.3***	***1.4***
27	25	Campus Café North	Interior	1st	Serving Area 2	Ceiling	Deck	Metal	Blue	Intact	Negative	0.01	0.05
28	26	Campus Café North	Interior	1st	Kitchen	Wall		CMU	White	Intact	Negative	0	0.02
29	27	Campus Café North	Interior	1st	Kitchen	Door		Wood	Gray	Intact	Negative	0	0.02
30	28	Campus Café North	Interior	1st	Kitchen	Door	Casing	Metal	Gray	Intact	Negative	0.03	0.06
31	29	Campus Café North	Interior	1st	Storage	Floor		Concrete	Gray	Intact	Negative	0	0.02
32	30	Campus Café North	Interior	1st	Storage	Ceiling	Duct	Metal	Gray	Intact	Negative	0.05	0.23
33	***31***	***Campus Café North***	***Interior***	***1st***	***Storage***	***Ceiling***	***Suppor Beam***	***Metal***	***Red***	***Intact***	***Positive***	***2.1***	***0.9***
34	32	Campus Café North	Interior	1st	Storage	Ceiling	Pipe	Metal	Gray	Intact	Negative	0.09	0.22
35	33	Campus Café North	Interior	1st	Office	Wall		Sheetrock	White	Intact	Negative	0	0.02
36	34	Campus Café North	Interior	Basement	Fan Room	Wall		CMU	Blue	Intact	Negative	0	0.02
37	35	Campus Café North	Interior	Basement	Fan Room	Floor		Concrete	Gray	Intact	Negative	0	0.02
38	36	Campus Café North	Interior	Basement	Fan Room	Ceiling	Duct	Metal	Gray	Intact	Negative	0.01	0.06
39	***37***	***Campus Café North***	***Interior***	***Basement***	***Fan Room***	***Ceiling***	***Support Beam***	***Metal***	***Red***	***Intact***	***Positive***	***1.6***	***0.5***
40	38	Campus Café North	Interior	Basement	Fan Room	Door		Metal	Gray	Intact	Negative	0.02	0.04
41	39	Campus Café North	Interior	Basement	Fan Room	Door	Casing	Metal	Gray	Intact	Negative	0.04	0.07
42	40	Campus Café North	Interior	Basement	Storage Room	Wall		Sheetrock	Orange	Intact	Negative	0	0.02
43	41	Campus Café North	Interior	Basement	Storage Room	Floor		Concrete	Red	Intact	Negative	0.11	0.08
44	42	Campus Café North	Interior	Basement	Storage Room	Wall		CMU	Orange	Intact	Negative	0	0.02
45	43	NIST (<0.01)									Negative	0	0.02
46	44	***NIST (1.04 +/- 0.06)***									***Positive***	***1.1***	***0.1***

Niton Technician(s): James D Klemm
Conducted: January 16, 2018

Appendix B:
RADIATION, XRF SPECTRUM ANALYZER & PERSONNEL CERTIFICATIONS

NEW YORK STATE DEPARTMENT OF HEALTH

RADIOACTIVE MATERIALS LICENSE

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

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

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

9. Authorized use.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

C. A copy of this license.

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

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

FOR THE NEW YORK STATE DEPARTMENT OF HEALTH

Date: JUN 15 2016

By _____

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

DJS/NAK:ks

United States Environmental Protection Agency

This is to certify that

Quality Environmental Solutions & Technologies, Inc

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

In the Jurisdiction of:

All EPA Administered States, Tribes, and Territories

This certification is valid from the date of issuance and expires December 01, 2021

NAT-119213-2

Certification #

December 01, 2016

Issued On

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

December 01, 2016

Lawrence Holzapfel
Quality Environmental Solutions & Technologies, Inc
1376 Route 9
Wappingers Falls, NY 12590

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

Dear Lawrence Holzapfel:

Thank you for applying to the U.S. Environmental Protection Agency (EPA) for certification to conduct Renovation, Repair and Painting Activities in target housing and child-occupied facilities. I am pleased to inform you that, pursuant to 40 CFR Part 745, Subpart E, your renovation, repair and painting firm is certified. Your certificate is enclosed.

This certification **expires on December 01, 2021 and is valid in All EPA Administered States, Tribes, and Territories**. However, if a State in which you are certified obtains program authorization during the term of this certification, the scope of your certification will be diminished to exclude the affected area.

Your EPA firm certification is subject to the following restrictions:

1) Individual states and Indian tribes, whether authorized or not, are not required to accept EPA certification and may accept or reject it under its own authority. Please be aware that your EPA certification does not relieve you of any obligations you may have to any State or Indian tribe regarding renovation, repair and painting activities.

2) EPA certification is specific and limited as described above. If you wish to obtain certification in other lead-based paint disciplines, you must apply separately.

3) In advertising the EPA certification, firms must indicate clearly that the firm is certified only for purposes of Section 402 of TSCA. Failure to accurately state EPA certification conditions could result in EPA suspending or withdrawing certification.

4) EPA may conduct audits and/or inspections to ensure continued compliance with regulatory standards, and may revoke or suspend its certification if subsequent alterations or deviations result with the firm no longer meeting the standards found at 40 CFR Part 745, Subpart E.

If you have questions about the renovation, repair and painting rule or need assistance, please contact the Regional Lead Coordinator, Vickie Pane, of the EPA Region 2 staff at 732-321-6671. If you have any questions about your firm certification, please contact the National Lead Information Center at 1-800-424-LEAD and refer to **Application ID number C506794**. Congratulations, and thank you for your interest in being a certified renovation, repair and painting firm.

Sincerely,

Michelle Price

Michelle Price, Chief
Lead, Heavy Metals, and Inorganics Branch

Enclosures

United States Environmental Protection Agency

This is to certify that

Quality Environmental Solutions & Technologies, Inc

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

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires December 15, 2019

LBP-119213-1

Certification #

December 01, 2016

Issued On

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

December 01, 2016

Lawrence Holzapfel
Quality Environmental Solutions & Technologies, Inc
1376 Route 9
Wappingers Falls, NY 12590

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

Dear Lawrence Holzapfel:

Thank you for applying to the U.S. Environmental Protection Agency (EPA) for certification to conduct Lead-based Paint Activities in target housing and child-occupied facilities. I am pleased to inform you that, pursuant to 40 CFR Part 745, Subpart L, your lead-based paint activities firm is certified. Your certificate is enclosed.

This certification **expires on December 15, 2019 and is valid in All EPA Administered States, Tribes, and Territories**. However, if a State in which you are certified obtains program authorization during the term of this certification, the scope of your certification will be diminished to exclude the affected area.

Your EPA firm certification is subject to the following restrictions:

1) Individual states and Indian tribes, whether authorized or not, are not required to accept EPA certification and may accept or reject it under its own authority. Please be aware that your EPA certification does not relieve you of any obligations you may have to any State or Indian tribe regarding lead-based paint activities.

2) EPA certification is specific and limited as described above. If you wish to obtain certification in other lead-based paint disciplines, you must apply separately.

3) In advertising the EPA certification, firms must indicate clearly that the firm is certified only for purposes of Section 402 of TSCA. Failure to accurately state EPA certification conditions could result in EPA suspending or withdrawing certification.

4) EPA may conduct audits and/or inspections to ensure continued compliance with regulatory standards, and may revoke or suspend its certification if subsequent alterations or deviations result with the firm no longer meeting the standards found at 40 CFR Part 745, Subpart L.

If you have questions about the lead-based paint activities rule or need assistance, please contact the Regional Lead Coordinator, Vickie Pane, of the EPA Region 2 staff at 732-321-6671. If you have any questions about your firm certification, please contact the National Lead Information Center at 1-800-424-LEAD and refer to **Application ID number C506794**. Congratulations, and thank you for your interest in being a certified abatement firm.

Sincerely,

Michelle Price

Michelle Price, Chief
Lead, Heavy Metals, and Inorganics Branch

Enclosures

Certificate of Completion

This is to certify that

James Klemm

Has completed the

Radiation Safety for X-ray Tube Based Instruments

Online training course

On

3/9/2017

Supervisor signature

Erin Poitras, RSO Thermo Fisher Scientific
Portable Analytical Instruments

Certificate of Completion

This is to certify that

James Klemm

Has completed the

Sealed Source XRF - Radiation Safety

Online training course

On

3/9/2017

Supervisor signature

Erin Poitras, RSO Thermo Fisher Scientific
Portable Analytical Instruments

Certificate of Completion

This is to certify that

James Klemm

Has completed the

Transport of Li Ion Batteries

Online training course

On

3/9/2017

Supervisor signature

Erin Poitras, RSO Thermo Fisher Scientific
Portable Analytical Instruments

Certificate of Completion

This is to certify that

James Klemm

Has completed the

Transport of Radioactive Sealed Sources in XRF Analyzers

Online training course

On

3/9/2017

Supervisor signature

Erin Poitras, RSO Thermo Fisher Scientific
Portable Analytical Instruments

Certificate of Completion

This is to certify that

James Klemm

Has completed

US Regulations for Handheld XRF Analyzers with Radioactive Sealed Sources

3/9/2017

Supervisor signature

Erin Poitras, RSO Thermo Fisher Scientific
Portable Analytical Instruments

QuES&T

Quality Environmental Solutions & Technologies, Inc.

January 29, 2018

SUNY Purchase Association
735 Anderson Hill Road
Purchase, NY 10577

ATTN: Patrick Savolskis

Via Email: **Patrick.savolskis@purchase.edu**

Re: SUNY Purchase
Café Addition & Renovation
Limited PCB Bulk Sampling
QuES&T Project #Q18-1530

Dear Mr. Savolskis,

Quality **E**nvironmental **S**olutions **& T**echnologies Inc. **(QuES&T)** performed collection of representative, homogenous exterior caulks for the presence of Polychlorinated Biphenyls (PCBs) throughout specific exterior renovation areas of the Café Building, located at SUNY Purchase, Purchase NY on January 17, 2018. Sampling was limited to specific accessible, representative building components and immovable objects potentially affected by scheduled interior and/or exterior renovation activities.

Mr. James Klemm, of **QuES&T**, performed collection of a total of one **(1)** bulk sample. Sampling was performed in compliance with protocols outlined by New York State Education Department (NYSED). Bulk samples were properly packaged and forwarded to York Analytical Laboratories, Inc., in Stratford, CT for analysis using method SW846-3550B/8082. Copies of the analytical results are contained within attached appendices for review.

A summation of sample(s) collected and associated results are as follows:

PCB Caulk Sampling Summary:

Sample #	Location / Description	Material Matrix	Color	Substrate	Applicable Regulatory Standards (Most Stringent)	Classification Result Upon Lab analysis
1530-PCB-01	Café, Façade, Window Frame, to Brick Façade	Caulk	Brown	Brick	USEPA 40 CFR 761	No Polychlorinated Biphenyls (PCBs) detected upon laboratory analysis.

It should be noted that the information contained within this report is based upon observation and test results provided by **QuES&T.** These observations and results are time dependent, subject to changing site conditions and revisions to Federal, State, and Local regulations. **QuES&T** warrants that these findings have been promulgated after being prepared in general accordance with generally accepted practices in the abatement industries. **QuES&T** also recognizes that raw testing data is not usually sufficient to make all abatement and management decisions. No other warranties are expressed or implied.

Should you wish to discuss this matter further or require additional information concerning this transmittal, feel free to contact us at (845) 298- 6031. **QuES&T** greatly appreciates the opportunity to assist SUNY Purchase Association in the environmental services area and we look forward to working again with you in the future.

Sincerely,

Tanay Ranadive

Tanay Ranadive
Field and Technical Services
NYS AHERA Inspector
Cert. #AH 15-10696
NYS Mold Assessor

Cc: lgoldstein@qualityenv.com
QuES&T File

QuES&T
Quality Environmental Solutions & Technologies, Inc.

Appendix A:
ANALYTICAL DATA

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

Technical Report

prepared for:

QuES & T
1376 Rt. 9
Wappingers Falls NY, 12590
Attention: Larry Goldstein

Report Date: 01/26/2018
Client Project ID: Q18-1530
York Project (SDG) No.: 18A0606

Report Date: 01/26/2018
Client Project ID: Q18-1530
York Project (SDG) No.: 18A0606

QuES & T
1376 Rt. 9
Wappingers Falls NY, 12590
Attention: Larry Goldstein

Purpose and Results

This report contains the analytical data for the sample(s) identified on the attached chain-of-custody received in our laboratory on January 19, 2018 and listed below. The project was identified as your project: **Q18-1530**.

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

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

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

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

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

York Sample ID	Client Sample ID	Matrix	Date Collected	Date Received
18A0606-01	1530-PCB-01	Caulk	01/17/2018	01/19/2018

General Notes for York Project (SDG) No.: 18A0606

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

Approved By: 

Date: 01/26/2018

Benjamin Gulizia
Laboratory Director

Sample Information

Client Sample ID: 1530-PCB-01 **York Sample ID:** 18A0606-01

York Project (SDG) No.	Client Project ID	Matrix	Collection Date/Time	Date Received
18A0606	Q18-1530	Caulk	January 17, 2018 3:00 pm	01/19/2018

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550C

CAS No.	Parameter	Result	Flag	Units	Reported to LOQ	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg	0.500	1	EPA 8082A	01/23/2018 14:06	01/24/2018 17:51	LAB
							Certifications:	NELAC-NY10854,CTDOH,NJDEP		
11104-28-2	Aroclor 1221	ND		mg/kg	0.500	1	EPA 8082A	01/23/2018 14:06	01/24/2018 17:51	LAB
							Certifications:	NELAC-NY10854,CTDOH,NJDEP		
11141-16-5	Aroclor 1232	ND		mg/kg	0.500	1	EPA 8082A	01/23/2018 14:06	01/24/2018 17:51	LAB
							Certifications:	NELAC-NY10854,CTDOH,NJDEP		
53469-21-9	Aroclor 1242	ND		mg/kg	0.500	1	EPA 8082A	01/23/2018 14:06	01/24/2018 17:51	LAB
							Certifications:	NELAC-NY10854,CTDOH,NJDEP		
12672-29-6	Aroclor 1248	ND		mg/kg	0.500	1	EPA 8082A	01/23/2018 14:06	01/24/2018 17:51	LAB
							Certifications:	NELAC-NY10854,CTDOH,NJDEP		
11097-69-1	Aroclor 1254	ND		mg/kg	0.500	1	EPA 8082A	01/23/2018 14:06	01/24/2018 17:51	LAB
							Certifications:	NELAC-NY10854,CTDOH,NJDEP		
11096-82-5	Aroclor 1260	ND		mg/kg	0.500	1	EPA 8082A	01/23/2018 14:06	01/24/2018 17:51	LAB
							Certifications:	NELAC-NY10854,CTDOH,NJDEP		
1336-36-3	* Total PCBs	ND		mg/kg	0.500	1	EPA 8082A	01/23/2018 14:06	01/24/2018 17:51	LAB
							Certifications:			

	Surrogate Recoveries	Result	Acceptance Range
877-09-8	*Surrogate: Tetrachloro-m-xylene*	*77.0 %*	*30-140*
2051-24-3	*Surrogate: Decachlorobiphenyl*	*83.0 %*	*30-140*

Sample and Data Qualifiers Relating to This Work Order

Definitions and Other Explanations

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

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

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

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

Certification for pH is no longer offered by NYDOH ELAP.

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

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

QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC.

18A0606

BULK SAMPLE FORM

Field Chain-of-Custody Record

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

Rec'd Chris 1-19-18 8:10

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

Results Send Via: lgoldstein@qualityenv.com

Invoice to: **Suann Lander (QuES&T)**

Sampled By (Print): **James Klemm**

Sampled By (Sign.): James Klemm

Project #: **Q18-1530**

Project ID: **SUNY Purchase Assocation**
Café Rennovation

SAMPLE #	LOCATION	SAMPLE DATE	MATRIX	ANALYSIS REQUESTED	CONTAINER
1530-PCB-01	Café, Façade, Window Frame to Brick Façade	1/17/2018	Caulk (Grey)	PCB	Glass 8 oz.

ANALYSIS TURNAROUND: 5-Day Turn-Around

MH 1/19/18 1519 1.8

PAGE 1 OF 1

Appendix B:
PERSONNEL CERTIFICATIONS

NEW YORK STATE

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

CERTIFICATION

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

Minority Business Enterprise (MBE)

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

Quality Environmental Solutions & Technologies Inc.

Certification Awarded on: August 11, 2015
Expiration Date: August 11, 2018
File ID#: 49952

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

A Division of Empire State Development

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. ROBERT Q. BRADLEY
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Acrylates

Acrolein (Propenal)	EPA 8260C
Acrylonitrile	EPA 8260C
Methyl methacrylate	EPA 8260C

Amines

1,2-Diphenylhydrazine	EPA 8270D
2-Nitroaniline	EPA 8270D
3-Nitroaniline	EPA 8270D
4-Chloroaniline	EPA 8270D
4-Nitroaniline	EPA 8270D
Aniline	EPA 8270D
Carbazole	EPA 8270D
Diphenylamine	EPA 8270D

Benzidines

3,3'-Dichlorobenzidine	EPA 8270D
Benzidine	EPA 8270D

Characteristic Testing

Corrosivity	EPA 9045D
Free Liquids	EPA 9095B
Ignitability	EPA 1010A
Synthetic Precipitation Leaching Proc.	EPA 1312
TCLP	EPA 1311

Chlorinated Hydrocarbon Pesticides

4,4'-DDD	EPA 8081B
4,4'-DDE	EPA 8081B

Chlorinated Hydrocarbon Pesticides

4,4'-DDT	EPA 8081B
Aldrin	EPA 8081B
alpha-BHC	EPA 8081B
alpha-Chlordane	EPA 8081B
Atrazine	EPA 8270D
beta-BHC	EPA 8081B
Chlordane Total	EPA 8081B
delta-BHC	EPA 8081B
Dieldrin	EPA 8081B
Endosulfan I	EPA 8081B
Endosulfan II	EPA 8081B
Endosulfan sulfate	EPA 8081B
Endrin	EPA 8081B
Endrin aldehyde	EPA 8081B
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
Heptachlor epoxide	EPA 8081B
Lindane	EPA 8081B
Methoxychlor	EPA 8081B
Mirex	EPA 8081B
Toxaphene	EPA 8081B

Chlorinated Hydrocarbons

1,2,3-Trichlorobenzene	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D

Serial No.: 55801

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. ROBERT Q. BRADLEY
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Chlorinated Hydrocarbons

1,2,4-Trichlorobenzene	EPA 8270D
2-Chloronaphthalene	EPA 8270D
Hexachlorobenzene	EPA 8270D
Hexachlorobutadiene	EPA 8270D
Hexachlorocyclopentadiene	EPA 8270D
Hexachloroethane	EPA 8270D

Chlorophenoxy Acid Pesticides

2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A
Dicamba	EPA 8151A

Haloethers

2,2'-Oxybis(1-chloropropane)	EPA 8270D
4-Bromophenylphenyl ether	EPA 8270D
4-Chlorophenylphenyl ether	EPA 8270D
Bis(2-chloroethoxy)methane	EPA 8270D
Bis(2-chloroethyl)ether	EPA 8270D

Metals I

Barium, Total	EPA 6010C
	EPA 6020A
Cadmium, Total	EPA 6010C
	EPA 6020A
Calcium, Total	EPA 6010C
Chromium, Total	EPA 6010C

Metals I

Chromium, Total	EPA 6020A
Copper, Total	EPA 6010C
	EPA 6020A
Iron, Total	EPA 6010C
Lead, Total	EPA 6010C
	EPA 6020A
Magnesium, Total	EPA 6010C
Manganese, Total	EPA 6010C
	EPA 6020A
Nickel, Total	EPA 6010C
	EPA 6020A
Potassium, Total	EPA 6010C
Silver, Total	EPA 6010C
	EPA 6020A
Sodium, Total	EPA 6010C

Metals II

Aluminum, Total	EPA 6010C
	EPA 6020A
Antimony, Total	EPA 6010C
	EPA 6020A
Arsenic, Total	EPA 6010C
	EPA 6020A
Beryllium, Total	EPA 6010C
	EPA 6020A
Chromium VI	EPA 7196A

Serial No.: 55801

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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Metals II	
Mercury, Total	EPA 7471B
	EPA 7473
Selenium, Total	EPA 6010C
	EPA 6020A
Vanadium, Total	EPA 6010C
	EPA 6020A
Zinc, Total	EPA 6010C
	EPA 6020A
Metals III	
Cobalt, Total	EPA 6010C
	EPA 6020A
Molybdenum, Total	EPA 6020A
Thallium, Total	EPA 6010C
	EPA 6020A
Tin, Total	EPA 6020A
Titanium, Total	EPA 6020A
Miscellaneous	
Boron, Total	EPA 6020A
Cyanide, Total	EPA 9014
Extractable Organic Halides	EPA 9023
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 8270D
2,6-Dinitrotoluene	EPA 8270D
Isophorone	EPA 8270D
Nitroaromatics and Isophorone	
Nitrobenzene	EPA 8270D
Pyridine	EPA 8270D
Nitrosoamines	
N-Nitrosodimethylamine	EPA 8270D
N-Nitrosodi-n-propylamine	EPA 8270D
N-Nitrosodiphenylamine	EPA 8270D
Organophosphate Pesticides	
Parathion ethyl	EPA 8270D
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 8270D
Bis(2-ethylhexyl) phthalate	EPA 8270D
Diethyl phthalate	EPA 8270D
Dimethyl phthalate	EPA 8270D
Di-n-butyl phthalate	EPA 8270D
Di-n-octyl phthalate	EPA 8270D
Polychlorinated Biphenyls	
PCB-1016	EPA 8082A
PCB-1221	EPA 8082A
PCB-1232	EPA 8082A
PCB-1242	EPA 8082A

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Polychlorinated Biphenyls	
PCB-1248	EPA 8082A
PCB-1254	EPA 8082A
PCB-1260	EPA 8082A
PCB-1262	EPA 8082A
PCB-1268	EPA 8082A
PCBs in Oil	EPA 8082A
Polynuclear Aromatic Hydrocarbons	
Acenaphthene	EPA 8270D
Acenaphthylene	EPA 8270D
Anthracene	EPA 8270D
Benzo(a)anthracene	EPA 8270D
Benzo(a)pyrene	EPA 8270D
Benzo(b)fluoranthene	EPA 8270D
Benzo(ghi)perylene	EPA 8270D
Benzo(k)fluoranthene	EPA 8270D
Chrysene	EPA 8270D
Dibenzo(a,h)anthracene	EPA 8270D
Fluoranthene	EPA 8270D
Fluorene	EPA 8270D
Indeno(1,2,3-cd)pyrene	EPA 8270D
Naphthalene	EPA 8270D
Phenanthrene	EPA 8270D
Pyrene	EPA 8270D
Priority Pollutant Phenols	
2,3,4,6 Tetrachlorophenol	EPA 8270D
Priority Pollutant Phenols	
2,4,5-Trichlorophenol	EPA 8270D
2,4,6-Trichlorophenol	EPA 8270D
2,4-Dichlorophenol	EPA 8270D
2,4-Dimethylphenol	EPA 8270D
2,4-Dinitrophenol	EPA 8270D
2-Chlorophenol	EPA 8270D
2-Methyl-4,6-dinitrophenol	EPA 8270D
2-Methylphenol	EPA 8270D
2-Nitrophenol	EPA 8270D
4-Chloro-3-methylphenol	EPA 8270D
4-Methylphenol	EPA 8270D
4-Nitrophenol	EPA 8270D
Pentachlorophenol	EPA 8270D
Phenol	EPA 8270D
Semi-Volatile Organics	
1,1'-Biphenyl	EPA 8270D
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
2-Methylnaphthalene	EPA 8270D
Acetophenone	EPA 8270D
Benzaldehyde	EPA 8270D
Benzoic Acid	EPA 8270D
Benzyl alcohol	EPA 8270D
Caprolactam	EPA 8270D

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Semi-Volatile Organics		**Volatile Aromatics**	
Dibenzofuran	EPA 8270D	Total Xylenes	EPA 8260C
Volatile Aromatics		**Volatile Halocarbons**	
1,2,4-Trichlorobenzene, Volatile	EPA 8260C	1,1,1,2-Tetrachloroethane	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260C	1,1,1-Trichloroethane	EPA 8260C
1,2-Dichlorobenzene	EPA 8260C	1,1,2,2-Tetrachloroethane	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260C	1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260C
1,3-Dichlorobenzene	EPA 8260C	1,1,2-Trichloroethane	EPA 8260C
1,4-Dichlorobenzene	EPA 8260C	1,1-Dichloroethane	EPA 8260C
2-Chlorotoluene	EPA 8260C	1,1-Dichloroethene	EPA 8260C
4-Chlorotoluene	EPA 8260C	1,1-Dichloropropene	EPA 8260C
Benzene	EPA 8260C	1,2,3-Trichloropropane	EPA 8260C
Bromobenzene	EPA 8260C	1,2-Dibromo-3-chloropropane	EPA 8260C
Chlorobenzene	EPA 8260C	1,2-Dibromoethane	EPA 8260C
Ethyl benzene	EPA 8260C	1,2-Dichloroethane	EPA 8260C
Isopropylbenzene	EPA 8260C	1,2-Dichloropropane	EPA 8260C
m/p-Xylenes	EPA 8260C	1,3-Dichloropropane	EPA 8260C
Naphthalene, Volatile	EPA 8260C	2,2-Dichloropropane	EPA 8260C
n-Butylbenzene	EPA 8260C	2-Chloroethylvinyl ether	EPA 8260C
n-Propylbenzene	EPA 8260C	Bromochloromethane	EPA 8260C
o-Xylene	EPA 8260C	Bromodichloromethane	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260C	Bromoform	EPA 8260C
sec-Butylbenzene	EPA 8260C	Bromomethane	EPA 8260C
Styrene	EPA 8260C	Carbon tetrachloride	EPA 8260C
tert-Butylbenzene	EPA 8260C	Chloroethane	EPA 8260C
Toluene	EPA 8260C	Chloroform	EPA 8260C

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Volatile Halocarbons

Chloromethane	EPA 8260C
cis-1,2-Dichloroethene	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260C
Dibromochloromethane	EPA 8260C
Dibromomethane	EPA 8260C
Dichlorodifluoromethane	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260C
Methylene chloride	EPA 8260C
Tetrachloroethene	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260C
Trichloroethene	EPA 8260C
Trichlorofluoromethane	EPA 8260C
Vinyl chloride	EPA 8260C

Volatile Organics

1,4-Dioxane	EPA 8260C
2-Butanone (Methylethyl ketone)	EPA 8260C
2-Hexanone	EPA 8260C
Acetone	EPA 8260C
Carbon Disulfide	EPA 8260C
Cyclohexane	EPA 8260C
Methyl acetate	EPA 8260C
Methyl cyclohexane	EPA 8260C
Methyl tert-butyl ether	EPA 8260C
tert-butyl alcohol	EPA 8260C

Volatile Organics

Vinyl acetate	EPA 8260C

Sample Preparation Methods

EPA 5035A-L
EPA 5035A-H
EPA 3580A
EPA 3010A
EPA 3050B
EPA 3550C
EPA 3546
EPA 3545A
EPA 3060A
EPA 9010C

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ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Lead in Dust Wipes	EPA 6010C
Lead in Paint	EPA 6010C

Sample Preparation Methods

EPA 3050B

Serial No.: 55802

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.

SECTION 003132 – GEOTECHNICAL DATA

PART 1 - GENERAL

1.1 SUMMARY

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

1.2 SUBSURFACE EXPLORATIONS

A. Subsurface conditions at the site have been explored by the performance of test borings, test pits, and laboratory testing.

B. Boring and test pit logs and laboratory test reports are attached at the end of this Section. The logs describe subsurface conditions encountered at the exploration locations at the time explorations were made.

C. No warranty is made of the continuity of strata or material between the exploration locations. The stratification lines on the logs represent approximate boundaries between soil types. The actual transitions may be gradual.

D. Water level readings may have been observed in the drill holes at times and under conditions as stated on the boring logs. Fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature and other factors not evident at the time measurements were made.

E. Subsurface exploration locations shown on the Drawings are approximate only and the Owner, Architect, Project Manager and/or design consultants make no representations regarding correctness of such information.

1.3 PROJECT CONDITIONS

A. Existing Conditions: Data and information furnished or referenced in the Geotechnical Engineering Report is for the Contractors' information. The Owner, Architect, or **Construction Manager** shall not be responsible for any interpretation of, or conclusion drawn from the data or information, by the Contractor.

B. Bidders shall make their own interpretations and conclusions of subsurface conditions that may affect methods or cost of construction. Bidders may conduct additional on-site subsurface investigations, at their own expense, in order to ascertain existing site conditions. Any such explorations must be coordinated and scheduled with the Owner and Project Manager. All disturbed areas must be restored to pre-investigative conditions.

1.4 GEOTECHNICAL DATA

A. Geotechnical Report: The following Geotechnical Report is attached at the end of this Section.

1. Geotechnical Engineering Report, Addition to Campus Center North, Purchase, New York; prepared by Terracon Consultants, Inc., dated March 10, 2017.

B. Soil Boring Data: Boring Location Plan, Test Boring Logs, and Test Pit Logs are attached at the end of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 003132

Geotechnical Engineering Report

Addition to Campus Center North
Purchase, New York
March 10, 2017
Terracon Project No. J2165193

Prepared for:
Doucet & Associates, Inc.
Easthampton, Massachusetts

Prepared by:
Terracon Consultants, Inc.
Rocky Hill, Connecticut

March 10, 2017

Doucet & Associates, Inc.
123 Union Street, Suite 302
Easthampton, MA 01027

Attn: Mr. Larry Rusiecki / Project Manager
P: (413) 203 2349 ext. 3055
F: (800) 587 2817
E: lrusiecki@doucetengineers.com

Re: Geotechnical Engineering Report
Addition to Campus Center North
Purchase, New York
Terracon Project No. J2165193

Dear Mr. Norton:

Terracon Consultants, Inc. (Terracon) is submitting, herewith, the results of our geotechnical evaluation for the above-referenced project. The purpose of this evaluation was to obtain information on subsurface conditions at the project site and, based on this information, to provide recommendations regarding the design and construction of foundations and site development for the proposed addition. These services were performed in general accordance with our Authorization to Proceed No. J2165193, signed December 11, 2016.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or if we may be of further service, please contact us.

Since[illegible]
Terracon Consultants, Inc.

Brian D[illegible]
Project Geotechnical Engineer

Stephen C. Lanne, P.E.
Senior Geotechnical Engineer

/jch/J2165193

Attachment

TABLE OF CONTENTS

EXECUTIVE SUMMARY

A geotechnical engineering report has been completed for the proposed addition to Campus Center North at the State University of New York (SUNY) located in Purchase, New York. Three test borings were advanced to depths ranging from about 17 to 25 feet below existing grade to provide geotechnical information.

Site subsurface conditions generally consist of uncontrolled fill over native silty sands with cobbles and boulders (glacial till). The following geotechnical considerations for project design and construction were identified and are discussed in the report.

- In our opinion, the on-site fill is unsuitable in its current condition for support of the foundations and floor slab of the proposed building addition. We therefore recommend that the majority of the fill be removed within the building footprint and replaced with compacted Structural Fill. Details regarding what should be removed and what may remain are discussed in the text of this report. Following the removal and replacement activities, the building may be supported on conventional foundations with a slab-on-grade deriving their support from the compacted Structural Fill.

- Based on the available data, it is our opinion that the on-site fill and glacial soils, following removal, are generally less desirable for reuse as Structural Fill. However, these materials may be selectively reused as Common Fill, provided they are placed at moisture contents suitable for compaction and that cobbles encountered during excavation are segregated from the fill and not reused.

- Site Class “C” may be used for seismic design considerations.

- Groundwater was not encountered at the time of the explorations.

- Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. We therefore recommend that Terracon be retained to monitor this portion of the work.

This summary should be used in conjunction with the entire report for design purposes. Details are not included or fully developed in this summary; the report must be read in its entirety for a comprehensive understanding of the information contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

GEOTECHNICAL ENGINEERING REPORT
ADDITION TO CAMPUS CENTER NORTH
PURCHASE, NEW YORK

Terracon Project No. J2165193
March 10, 2017

1.0 INTRODUCTION

A geotechnical engineering evaluation has been completed for the proposed addition to Campus Center North at the State University of New York (SUNY) at Purchase, in the hamlet of Purchase, town of Harrison, New York, as shown on the Site Location Map (Exhibit A-1) in Appendix A. Three soil borings (B-1, B-2, and B-3) were drilled throughout the site to depths ranging from about 17 to 25 feet below existing ground surface. An Exploration Location Diagram (Exhibit A-2) and individual exploration logs are included in Appendix A.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Earthwork
- Foundation design and construction
- Seismic considerations
- Slab design and construction

2.0 PROJECT INFORMATION

2.1 Project Description

Our understanding of the project is based upon review of the following:

- *"Construction Floor Plan",* Drawing No. A101, by Phase Zero Design of Simsbury, Connecticut.
- *"Site Layout & Materials Plan",* Drawing No. C-5, Dated November 11, 2016, by Phase Zero Design of Simsbury, Connecticut.

Item	Description
Site Layout	Appendix A, Exhibit A-2, Exploration Location Diagram.
Building	Single-story, approximately 1,400-square foot (sf) addition, with no below grade area, to the southwest of existing Campus Center North Dining hall.
Building Construction	Not provided, assumed to be brick exterior walls with interior steel framing, steel columns, concrete floor.

Item	Description
Finished Floor Elevation	Close to existing grade, approximately Elevation (El) 341 feet.
Estimated Maximum Loads	Walls: 1.2 to 3 kips per lineal foot Columns: 30 to 75 kips Slab: 150 pounds per square foot
Grading	Not provided, but assumed to be close to existing grade.

2.2 Site Location and Description

Item	Description
Location	Campus Center North, located on the east side of Lincoln Avenue, approximately 120 feet north of the North Arcade Overpass, within the SUNY Purchase Campus in the Hamlet of Purchase, Town of Harrison, New York.
Existing improvements	Brick pedestrian walk / landscaping.
Current ground cover	Brick pavers / topsoil.
Existing topography	Relatively level.

The 2013 USGS topographic quadrangle map for Glenville, Connecticut shows the 330-foot surface elevation contour (NAVD 1988) traversing the center portion of the site.

3.0 SUBSURFACE EXPLORATIONS AND CONDITIONS

3.1 Typical Profile

Based on the results of the explorations and observations at the time of drilling, subsurface conditions on the project site can be generalized as follows:

Stratum	Depth to Bottom of Stratum (feet)	Material Encountered [1]	Consistency / Relative Density
1 [2]	16	Silty sand (SM), occasional cobbles, brown (Fill)	N/A
2	Not encountered	Silty sand (SM), with gravel, occasional cobbles and boulders, brown (Glacial Till)	Medium dense to very dense

1. Brick pavers (about 1 inch in thickness) underlain by Portland cement concrete (about 3 inches in thickness) was encountered at the surface of B-1. Topsoil (about 1 inch in thickness) underlain by subsoil (about 11 to 23 inches in thickness) was encountered at the ground surface at B-2 and B-3.
2. Encountered in B-1 only.

The *Surficial Geologic Map of New York – Lower Hudson Sheet (1989)* identifies native soils underlying the site as glacial till. However, fill likely associated with construction of the existing structure was encountered in B-1. The *Geologic Map of New York – Lower Hudson Sheet (1970)* indicates that bedrock, at depth, in the vicinity of the site as schist and amphibolite. Bedrock was not encountered in our borings.

Conditions encountered at each exploration location are summarized on the individual exploration logs in Appendix A of this report. Stratification boundaries on the exploration logs represent the approximate location of changes in soil types; *in situ*, the transition between materials may be gradual. Further details of the explorations can be found on the exploration logs.

3.2 Groundwater

Groundwater was not encountered at the time of the explorations. However, fluctuations in groundwater level may occur because of seasonal variations in the amount of rainfall, runoff, and other factors. Additionally, grade adjustments on and around the site, as well as surrounding drainage improvements, may affect the water table. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

Based on the results of our explorations, uncontrolled fill, likely related to the construction of Campus Center North, was encountered at B-1 to a depth of approximately 16 feet below existing grade. The on-site fill was not encountered at B-2 or B-3. We therefore anticipate the on-site fill is deepest adjacent to the exterior walls of the Campus Center North building, becoming shallower further away from the existing building. Based on our understanding that the proposed addition will be close to existing grade, we estimate that the depth of fill below the proposed bottom of footing elevation will be up to approximately 12.5 feet adjacent to the existing building.

In our opinion, the uncontrolled fill is unsuitable in its current condition for support of the foundations and floor slab of the proposed building due to the risk of unacceptable settlements occurring as a result of generally loose conditions and unknown variations in the nature and consistency of the material.

In general, there are three overall approaches to address the presence of unsuitable bearing materials such as uncontrolled fill: Removal and replacement of the fill, *in-situ* improvement of the fill, or deep foundations that bypass the fill. All three approaches would be technically feasible for this site. However, it is our opinion that *in-situ* ground improvements (such as rammed aggregate piers), or deep foundations (such as driven piles, drilled shafts, or helical anchors)

would not likely be cost effective due to the relatively small size of the addition (1,400 square feet). Furthermore, special care would be required with these types of foundation supports so that vibrations created during installation did not damage the existing building.

It is our opinion that removal and replacement of the fill will be more cost-effective than use of *in-situ* ground improvements or deep foundations. However, one has to consider the increase in lateral stresses against the existing foundation walls. We therefore recommend that the majority of the fill be removed within the building footprint and replaced with compacted Structural Fill. Foundations for the proposed addition should match the depth of the foundations of the existing building and then step up further away from the existing building. The slab-on-grade will derive support from the compacted Structural Fill.

It may be possible to reduce the amount of fill removal and replacement work by leaving approximately 1 to 2 feet of fill in place and then improving the fill that is left with suitable compaction equipment. The feasibility of leaving some of the fill in place would need to be evaluated by Terracon at the time of construction, and would depend on moisture levels in the fill at that time (if the fill is too wet, it wouldn't be possible to adequately compact it in place without excavating and drying). However, given the variability of the fill depths (which may make it difficult to deploy suitable compaction equipment in the excavation), and the potential delays to the removal process as the remaining materials are evaluated, the contractor may determine that it is more expedient to remove all the fill.

Last, in order to limit the potential for unnecessary excavation of suitable soils and to confirm that the necessary unsuitable materials have been removed, we recommend that Terracon be retained to observe the excavation and replacement activities.

4.2 Earthwork

4.2.1 Site Preparation

Brick pavers, topsoil, and any otherwise unsuitable materials should be removed prior to placing any new fill and prior to placement of concrete for foundations and floor slab. The existing fill should be overexcavated within the proposed addition's footprint and laterally outside the addition footprint to include the foundation bearing zone, which is defined as the volume below 2/3H:1V lines extending outward and downward from the lower edges of the footings. If it is desired to limit the amount of overexcavation and not remove all fill, the existing fill should be first removed to a depth at which there is believed to be no more than about 1 to 2 feet of existing fill remaining in place. Shallow test pits should be then be advanced in the presence of a Terracon representative to evaluate the thickness and nature of the remaining fill that will remain under the footings. If in our opinion, the remaining materials can be suitably compacted in place, the exposed subgrade should be thoroughly compacted with at least six passes of a minimum 5-ton (static weight) walk-behind roller or heavy-duty plate compactor. Unstable material at subgrade level should be removed and replaced with compacted Structural Fill. The excavation may then be backfilled in

accordance with our subsequent recommendations to attain design grade. If the remaining materials are judged to be too thick or unsuitable for in-place compaction, additional excavation would be required prior to placement of backfill.

Following the removal and replacement of fill in the building area, the soil subgrade in the surrounding sidewalk areas should be proofrolled with at least six passes of a minimum 5-ton (static weight) walk-behind roller or heavy-duty plate compactor. Unstable material at subgrade level should be removed and replaced with compacted Structural Fill. Fill may then be placed to attain the required grade.

4.2.2 Reuse of On-Site Materials

The on-site fill and glacial soils contain relatively high percentages of silt, which may make reuse less desirable, as these materials will be moisture sensitive and difficult to maintain at moisture levels suitable for compaction, particularly during periods of wet weather.

It is our opinion that the on-site fill and glacial soils are generally less desirable for reuse as Structural Fill. However, these materials may be selectively reused as Common Fill (i.e., in landscaping areas) provided they are placed at moisture contents suitable for compaction purposes and are compacted to the densities recommended below. Cobbles or boulders greater than 4 inches in maximum dimension, if encountered, should be culled/screened from the material prior to re-use.

4.2.3 Material Types

Fill and backfill should meet the following material property requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
Structural Fill [2]	GW, GW-GM, SW, SW-SM, SP, GP	All locations and elevations. The on-site fill and glacial soils are not suitable for reuse as structural fill. Imported material should meet the gradation requirements in Note 2.
Slab Base/ Pavement Subbase	GW, GW-GM, SW, SW-SM, SP, GP	Select fill beneath slabs and pavements meeting the gradation requirements of NYSDOT 733-04 Subbase Course, Type 2.
Common Fill [3]	Varies	Common fill may be used for general site grading. Common fill should not be used under settlement or frost-sensitive structures. The on-site fill and glacial soils may be selectively reused as common fill, provided they can be adequately compacted. These materials may be difficult to compact when wet or in damp conditions.
Crushed Stone	GP	For use on wet subgrades, as Structural Fill, and as drainage fill. Should be uniform ¾-inch angular crushed stone.
Lean Concrete	Not applicable	Can be used to level subgrades between foundations and native soils. Lean concrete should be flowable, self-

Fill Type [1]	USCS Classification	Acceptable Location for Placement
		compacting concrete with a compressive strength between 300 and 2,000 psi.

1. Compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used. Fill should not be placed on a frozen subgrade.
2. Imported structural fill should meet the following gradation:

Percent Passing by Weight

Sieve Size	Structural Fill
6″	100
3″	70 – 100
2″	(100)*
¾″	45 – 95
No. 4	30 – 90
No. 10	25 – 80
No. 40	10 – 50
No. 200	0 – 12

* Maximum 2-inch particle size within 12 inches of the underside of footings or slabs

3. Common fill should have a maximum particle size of 6 inches and no more than 25 percent by weight passing the US No. 200 sieve.

4.2.4 Compaction Requirements

Item	Description
Fill Lift Thickness	8 inches or less in loose thickness
Compaction Requirements [1]	95 percent maximum modified Proctor dry density (ASTM D1557, Method C)
Moisture Content – Granular Material	Workable moisture levels

1. We recommend that Structural Fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested, as required, until the specified moisture and compaction requirements are achieved.

4.2.5 Utility Trench Backfill

Trench excavations should be made with sufficient working space to permit construction, including backfill placement and compaction. As utility trenches can provide a conduit for groundwater flow, trenches should be backfilled with material that approximately matches the permeability characteristics of the surrounding soil. Should higher permeability fill be used in trenches, consideration should be given to installing seepage collars and/or check dams to reduce the likelihood of migration of water through the trenches. Fill placed as backfill for utilities located below the slab should consist of compacted Structural Fill or suitable bedding material.

4.2.6 Grading and Drainage

Adequate drainage should be provided at the site to reduce the likelihood of an increase in moisture content of the foundation soils. Pavement or parking areas should be sloped away from the building to reduce the likelihood of water ponding near the structure.

4.2.6 Earthwork Construction Considerations

Unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. Should unstable subgrade conditions develop, stabilization measures will need to be employed.

Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become frozen, wet, or disturbed, the affected material should be removed, or should be scarified, moisture conditioned, and recompacted.

As a minimum, temporary excavations should be sloped or braced, as required by Occupational Safety and Health Administration (OSHA) regulations, to provide stability and safe working conditions. The contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations, as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, State, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Terracon should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation; proofrolling; placement and compaction of controlled compacted fills; backfilling of excavations in the completed subgrade; and just prior to construction of foundations.

4.3 Foundation Recommendations

Following removal and replacement of the existing uncontrolled fill as described in **Section 4.2.1**, above, the proposed addition may be supported on shallow spread footings. Design recommendations for shallow foundations are presented in the following table and paragraphs:

4.3.1 Footing Design Recommendations

Description	Value
Net Allowable Bearing Pressure [1]	
Compacted Structural Fill over Existing Fill	4,000 psf
Minimum Strip Footing Width	18 inches
Minimum Isolated Spread Footing Width	24 inches

Description	Value
Minimum Embedment Below Finished Grade for Frost Protection [2]	42 inches (Town of Harrison)
Overexcavation [3]	Up to about 12.5 feet.
Approximate Total Settlement [3]	1 to 2 inches
Estimated Differential Settlement [4]	~ ½ to ¾ of total settlement
Total unit weight (γ) **Compacted Structural Fill over Existing Fill**	125 pcf
Passive earth pressure coefficient, K_p [5]	3.0 (ultimate)
Coefficient of sliding friction [6]	0.5 (ultimate)

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation.
2. For frost protection and to reduce effects of seasonal moisture variations in subgrade soils. For perimeter footings and footings beneath unheated areas. Alternatively, shallower foundations can be designed in accordance with American Society of Civil Engineers (ASCE) 32 – "*Design and Construction of Frost-Protected Shallow Foundations*."
3. Represents depth of possible overexcavation below bottom of foundation to remove on-site fill.
4. Foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footing, the thickness of compacted fill, and the quality of the earthwork operations.
5. Passive pressure calculated with this parameter should be reduced by at least a factor of safety of 3, to reflect the amount of movement required to mobilize the passive resistance.
6. A factor of safety of at least 1.5 should be applied to the sliding resistance.

New building addition foundations should be designed to bear at the same elevation as the existing building foundations, then step up as the foundations extend away from the existing structure. Foundation steps should be located such that no additional load is applied to the existing foundations.

Site underground utilities, light standard foundations, drainage structures, and the like may be soil supported in a similar manner to building footings. Foundations for site appurtenances may be designed on the basis of a net allowable bearing pressure of 3,000 psf. However, the net allowable bearing pressure should be reduced to 2,000 psf, if the foundation dimensions are less than the recommended minimum.

The underside of interior footings not exposed to outside temperatures should be at least 18 inches below finished floor level and should not be placed on the on-site fill unless approved by Terracon, as mentioned in **Section 4.2.1**. If interior footings are to be exposed to freezing temperatures during construction, the underside of interior footings should be at least 42 inches below adjacent grade unless underlain by lean concrete to the frost depth of 42 inches. If

construction occurs during cold weather, the soil bearing surfaces in exposed footing excavations should be protected from frost.

4.3.2 Spread Footing Construction Considerations

The base of foundation excavations should be free of water, loose soil, and deleterious materials prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the material at bearing level become wet, disturbed, or frozen, the affected material should be removed prior to placing concrete. Terracon should be retained to observe and test the foundation bearing materials.

Groundwater was not observed at the time of our explorations. Therefore, temporary dewatering is not expected to be required for foundation construction. However, the contractor should prevent groundwater, if encountered, and surface water runoff from collecting in the excavation. Subgrade soils that become unstable because of water and/or reworking by construction activity should be replaced with compacted Structural Fill, as necessary.

The predominant soil type at the recommended subgrade level will be the glacial, portions of which have an elevated silt content. Soils with a higher silt content will be sensitive to excess moisture and lose strength quickly during wet periods. Contractors experienced in earthwork construction in New England should be aware of the silty soil behavior and the effect that moisture and inclement weather can have on its workability. If a contractor bids construction knowing that earthwork must begin during the winter or wet months, the contractor should include a contingency in his bid to use off-site suitable fill, and to remove and dispose of on-site soils that become unsuitable.

4.4 Seismic Considerations

Description	Value
Code Used [1]	2010 Building Code of New York State (NYS Code)
Site Class [2]	C
Maximum Considered Earthquake Ground Motions (5 percent damping) [3]	0.060g (S_1 – 1.0 second spectral response acceleration)
	0.250g (S_s – 0.2 second spectral response acceleration)
Liquefaction Potential in Event of an Earthquake	Not susceptible

1. The NYS Code incorporates the Seismic Design Category approach from the 2015 International Building Code (IBC).
2. The IBC uses a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope requested does not include a 100-foot soil profile determination. However, we expect soils at least as dense as those encountered above 25 feet will extend to 100 feet.
3. Section 1613 of the 2015 IBC.

4.5 Slab-on-Grade

The slab-on-grade will derive support from the compacted Structural Fill. The potential for additional loads to the existing foundation wall from the proposed slab-on-grade should be evaluated by the Structural Engineer.

4.5.1 Slab-on-Grade Design Recommendations

Description	Value
Floor Slab Support [1,2]	6-inch thick layer compacted structural fill
Modulus of Subgrade Reaction	200 pounds per square inch per in (psi/in) for point loading

1. Floor slab should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Material meeting the NYSDOT 733-04 Subbase Course, Type 2, should be used.

Where appropriate, control joints should be saw-cut in the slab to help control the location and extent of cracking. The slab designer should refer to the ACI Design Manual for additional recommendations.

The use of a vapor retarder should be considered beneath a concrete slab-on-grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

4.5.2 Slab-on-Grade Construction Considerations

The general slab subgrade preparation activities will be accomplished early in this project when the fill below the proposed building is excavated and replaced. However, as construction proceeds, the soil subgrade may be disturbed because of utility excavations, construction traffic, precipitation, etc. As a result, the floor slab subgrade may not be suitable for placement of the slab base and concrete, and corrective action will be required.

We recommend the soil area underlying the floor slab be rough graded and then thoroughly compacted with at least six passes of a minimum 5-ton (static weight) walk-behind roller or heavy-duty plate compactor prior to final grading and placement of slab base or Structural Fill. Alternately, in areas with limited access, a walk-behind compactor capable of imparting a similar amount of energy may be used. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas with unsuitable conditions should be repaired by removing and replacing affected material with properly compacted Structural Fill. Floor slab subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report, immediately prior to placement of the slab base and concrete.

5.0 GENERAL COMMENTS

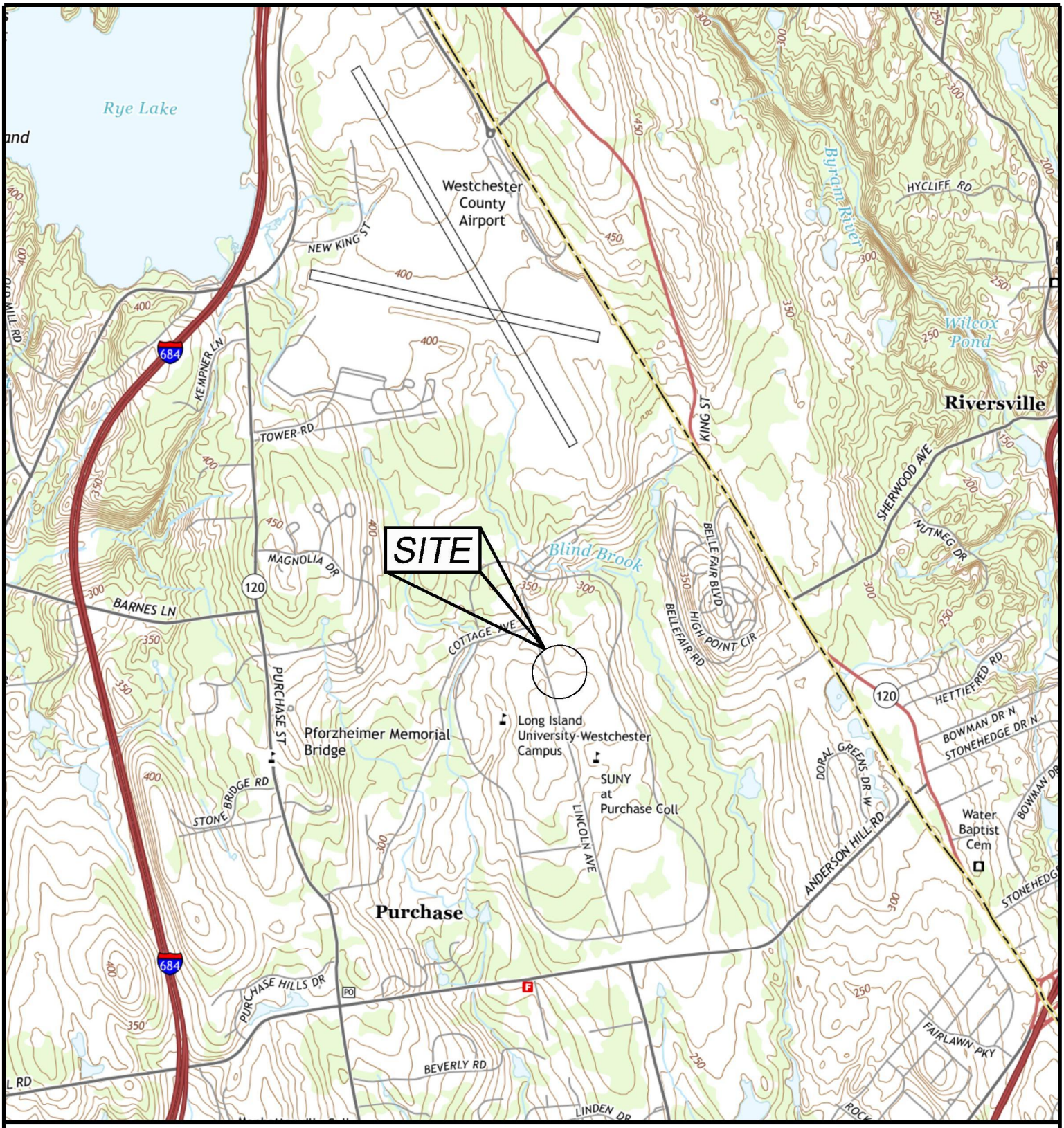
Terracon should be retained to review the final design plans and specifications, so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the explorations performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between explorations, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified, so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



N

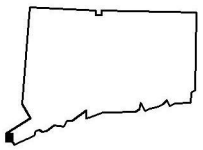
SCALE: 1:24 000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988



QUADRANGLE LOCATION

Project Mngr:	BDO
Drawn By:	JCH
Checked By:	BDO
Approved By:	SCL

Project No.	J2165193
Quadrangle:	GLENVILLE, CT - 2015
File No.	J2165193.dwg
Date:	March 2017

Terracon
Consulting Engineers and Scientists
201 Hammer Mill Road Rocky Hill, CT 06067
PH. (860)721 1900 FAX.(860)721 1939

SITE LOCATION MAP

ADDITION TO CAMPUS CENTER NORTH

LINCOLN AVENUE
PURCHASE, NEW YORK

EXHIBIT

A-1

60 0 30 60

APPROXIMATE SCALE IN FEET

LEGEND

B-1 TEST BORING LOCATION (TYP)

PROPOSED ADDITION

NOTES:

1. THIS DIAGRAM WAS PREPARED BASED ON THE *"CONSTRUCTION FLOOR PLAN"* BY PHASE ZERO DESIGN OF SIMSBURY, CONNECTICUT, DRAWING No. A101, DATED OCTOBER 28, 2016, AND AVAILABLE AERIAL PHOTOGRAPHY.
2. TERRACON MONITORED THE ADVANCEMENT OF TEST BORINGS B-1, B-2, AND B-3 ON JANUARY 12, 2017 WITH EQUIPMENT OWNED AND OPERATED BY GENERAL BORINGS, INC. OF PROSPECT, CONNECTICUT.
3. THE APPROXIMATE LOCATIONS OF THE EXPLORATIONS WERE TAPED FROM SITE FEATURES. THE LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
4. USE OF THIS DIAGRAM IS LIMITED TO THE ILLUSTRATION OF THE APPROXIMATE LOCATIONS OF THE EXPLORATIONS AND OTHER PERTINENT SITE FEATURES. ANY OTHER USE OF THIS DIAGRAM WITHOUT PERMISSION FROM TERRACON IS PROHIBITED.

Project Mngr:	BDO
Drawn By:	JCH
Checked By:	BDO
Approved By:	SCL

Project No.	J2165193
Scale:	1" = 60'
File No.	J2165193.dwg
Date:	March 2017

Terracon
Consulting Engineers and Scientists
201 Hammer Mill Road Rocky Hill, CT 06067
PH. (860)721 1900 FAX.(860)721 1939

EXPLORATION LOCATION DIAGRAM

ADDITION TO CAMPUS CENTER NORTH

LINCOLN AVENUE

PURCHASE, NEW YORK

EXHIBIT

A-2

Field Exploration Description

Terracon observed the advancement of three test borings (B-1, B-2, and B-3) throughout the site on January 12, 2017 using a backhoe-mounted Mobile B-51 rotary drill rig owned and operated by General Borings, Inc. of Prospect, Connecticut. The borings were advanced using 3¼-inch inside diameter continuous flight hollow-stem augers. B-1 was advanced through the brick pavers and underlying Portland cement concrete using an electric-powered drill with a 6-inch inside diameter core barrel. The exploration locations, which are shown on exhibit A-2, were located by taping from existing site features and estimating right angles. The locations of the explorations should be considered accurate only to the degree implied by the methods used to define them. Ground surface elevations were not provided prior to the preparation of this report.

In the split-barrel sampling procedure, which was used to take soil samples in the test borings, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler typically the middle 12 inches of the total 24-inch penetration by means of a 140-pound safety hammer with a free fall of 30 inches is the Standard Penetration Test (SPT) resistance value “N”. This “N” value is used to estimate the *in-situ* relative density of cohesionless soils and consistency of cohesive soils.

The soil samples were placed in labeled glass jars and transported to our laboratory for further review by a Terracon geotechnical engineer. Information provided on the boring logs attached to this report includes soil descriptions, relative density and/or consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled prior to the drill crew leaving the site.

Field logs of the borings, which included visual classifications of the materials encountered during drilling as well as interpretation of the subsurface conditions between samples, were prepared. The final boring logs included with this report represents further interpretation by the geotechnical engineer of the field logs and incorporate, where appropriate, modifications based on laboratory classification and testing of the samples.

BORING LOG NO. B-1

PROJECT: Addition to Campus Center North

CLIENT: Doucet & Associates, Inc.
Easthampton, Massachusetts

SITE: SUNY Purchase
Purchase, New York

LOCATION See Exhibit A-2

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
0.1		**BRICK PAVERS**						
0.4		**PORTLAND CEMENT CONCRETE**						
		FILL - SILTY SAND (SM), occasional cobbles, brown, loose to medium dense			X	14	6-7-7-8 N=14	
					X	8	7-4-3-4 N=7	
			5		X	10	4-1-3-4 N=4	14
					X	8	3-3-5-6 N=8	
			10		X	4	21-7-6-5 N=13	
16.0			15		X	12	7-9-18-23 N=27	
		SILTY SAND (SM), with gravel, occasional cobbles and boulders, brown, medium dense to dense, **(GLACIAL TILL)**						
19.0								
		Auger Refusal on Probable Boulder at 19 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with 2" outside-diameter split spoon sampler driven by a safety hammer operated by rope and cathead.

Advancement Method:
Electric-powered drill with 6-inch inside diameter barrel to 0.4 feet, then 3 1/4-inch inside diameter continuous flight hollow-stem augers to 19 feet.

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

Boring Started: 1/12/2017 | Boring Completed: 1/12/2017
Drill Rig: Mobile B-51 | Driller: J. Casson
Project No.: J2165193 | Exhibit: A-4

BORING LOG NO. B-2

PROJECT: Addition to Campus Center North

CLIENT: Doucet & Associates, Inc.
Easthampton, Massachusetts

SITE: SUNY Purchase
Purchase, New York

LOCATION See Exhibit A-2

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
0.1		**TOPSOIL**						
1.0		**SANDY SILT (ML)**, trace roots, brown to orange, loose, **(SUBSOIL)**						
		SILTY SAND (SM), with gravel, occasional cobbles, brown, medium dense to very dense, **(GLACIAL TILL)**				10	3-4-5-11 N=9	
						6	10-11-13-10 N=24	
			5					
						10	29-17-15-21 N=32	
						8	19-22-22-25 N=44	
			10					
						12	17-19-23-24 N=42	
			15					
						10	27-36-33-35 N=69	
17.0		***Boring Terminated at 17 Feet***						

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with 2" outside-diameter split spoon sampler driven by a safety hammer operated by rope and cathead.

Advancement Method:
3 1/4-inch inside diameter continuous flight hollow-stem augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion, Brick replaced and seated with grout.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

Boring Started: 1/12/2017 | Boring Completed: 1/12/2017
Drill Rig: Mobile B-51 | Driller: J. Casson
Project No.: J2165193 | Exhibit: A-5

BORING LOG NO. B-3

PROJECT: Addition to Campus Center North

CLIENT: Doucet & Associates, Inc.
Easthampton, Massachusetts

SITE: SUNY Purchase
Purchase, New York

LOCATION See Exhibit A-2

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
0.1		**TOPSOIL**						
		SANDY SILT (ML), trace roots, brown to orange, loose, **(SUBSOIL)**			X	15	3-4-5-9 N=9	
2.0		**SILTY SAND (SM)**, with gravel, occasional cobbles and boulders, brown to brown, dense to very dense, **(GLACIAL TILL)**			X	18	19-20-22-24 N=42	
			5		X	15	32-36-28-26 N=64	7
					X	17	31-29-37-32 N=66	
			10		X	19	13-30-31-50/3" N=61	
			15		X	12	22-22-27-45 N=49	
			20		X	13	12-10-50/4"	
25.3			25		X	0	50/3"	
		Sampler Refusal on Probable Boulder at 25.3 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.
Samples taken with 2" outside-diameter split spoon sampler driven by a safety hammer operated by rope and cathead.

Advancement Method:
3 1/4-inch inside diameter continuous flight hollow-stem augers

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
No free water observed

Terracon
201 Hammer Mill Rd
Rocky Hill, CT

Boring Started: 1/12/2017 | Boring Completed: 1/12/2017
Drill Rig: Mobile B-51 | Driller: J. Casson
Project No.: J2165193 | Exhibit: A-6

APPENDIX B
LABORATORY TESTING

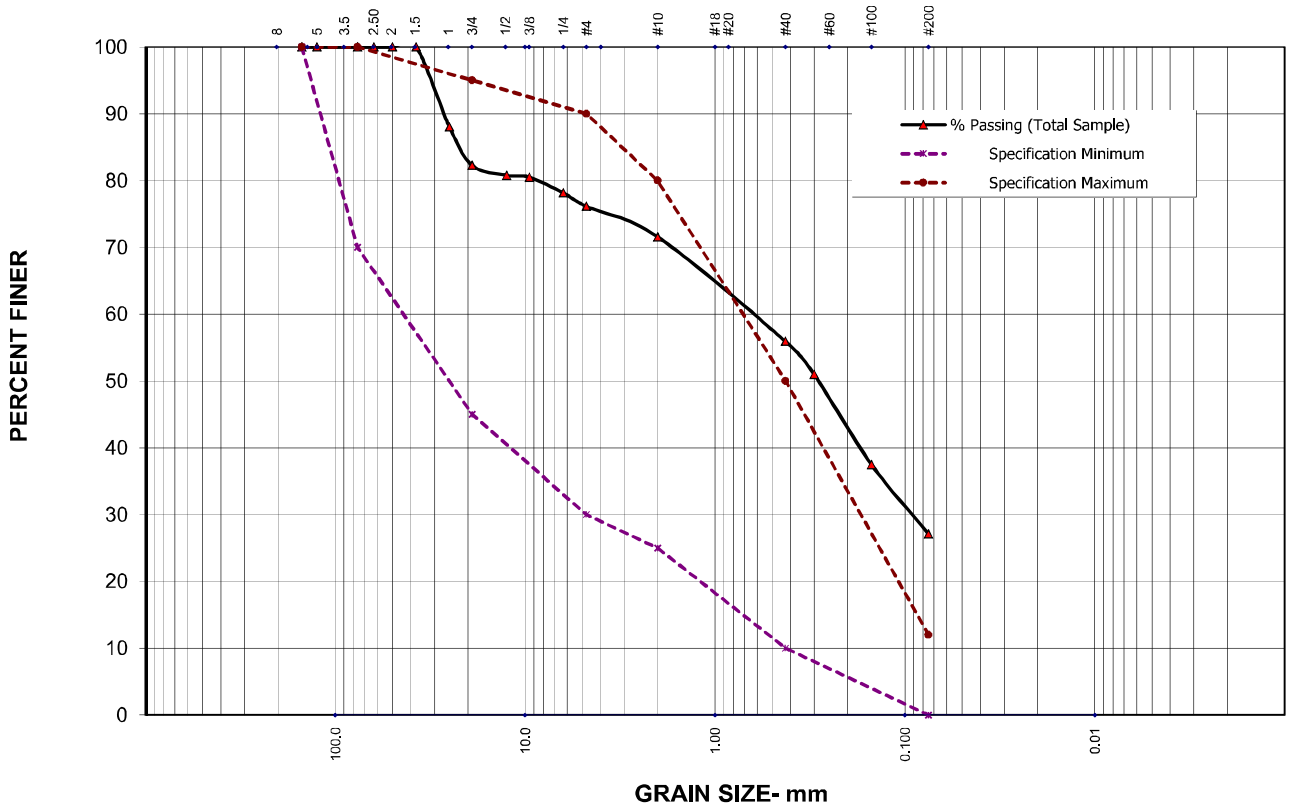
Laboratory Testing

Descriptive classifications of the soils indicated on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System (USCS). USCS symbols are also shown. A brief description of the USCS is also attached to this report. Classification was generally by visual/manual procedures, aided by laboratory testing.

Laboratory testing, consisting of two moisture content determinations (ASTM D2216) and two grain size distribution tests (ASTM D422), was performed on representative soil samples from the borings. The results of the moisture contents and grain size distribution tests are presented in this Appendix.

GRAIN SIZE DISTRIBUTION TEST REPORT

ASTM TEST METHOD: D422



% Cobbles	% Gravel	Coarse	Medium	Fine	% Fines	
		9.3	31.9	58.8	Silt (>0.002mm)	Clay (<0.002mm)
0	24	% Sand		49	27	

USCS Classification: Silty sand (SM), with gravel

Sieve Size (mm)	U.S. Sieve Size (in.)	Cumulative Wt. Retained	% Passing (Total Sample)	% Passing (Sand Portion)	Specification Minimum	Specification Maximum
150.0	6"	0.00	100		100	100
125.0	5"	0.00	100			
76.3	3"	0.00	100		70	100
62.5	2.5"	0.00	100			
50.0	2"	0.00	100			
37.5	1.5"	0.00	100			
25.0	1"	29.71	88			
19.0	3/4"	43.99	82		45	95
12.5	1/2"	47.69	81			
9.5	3/8"	48.36	81			
6.3	1/4"	54.21	78			
4.75	#4	59.20	76		30	90
2.00	#10	70.56	72		25	80
0.425	#40	109.34	56		10	50
0.300	#50	121.60	51			
0.150	#100	155.03	38			
0.075	#200	180.86	27		0	12

Total Dry Wt. 248.06 g
Moisture Content 7 %

Project:	**Addition to Campus Center North**	Project No.:	**J2165193**	Date:	**3/7/2017**
City:	Purchase, New York	Specification:	Terracon Structural Fill	Report No:	J2165193.0001
Source:	B-3	Sampled from:	5 to 7 feet (Glacial Till)		

Terracon

201 Hammer Mill Road
Rocky Hill, CT 06067
860-721-1900 (p) 860-721-1939 (f)
http://www.terracon.com/

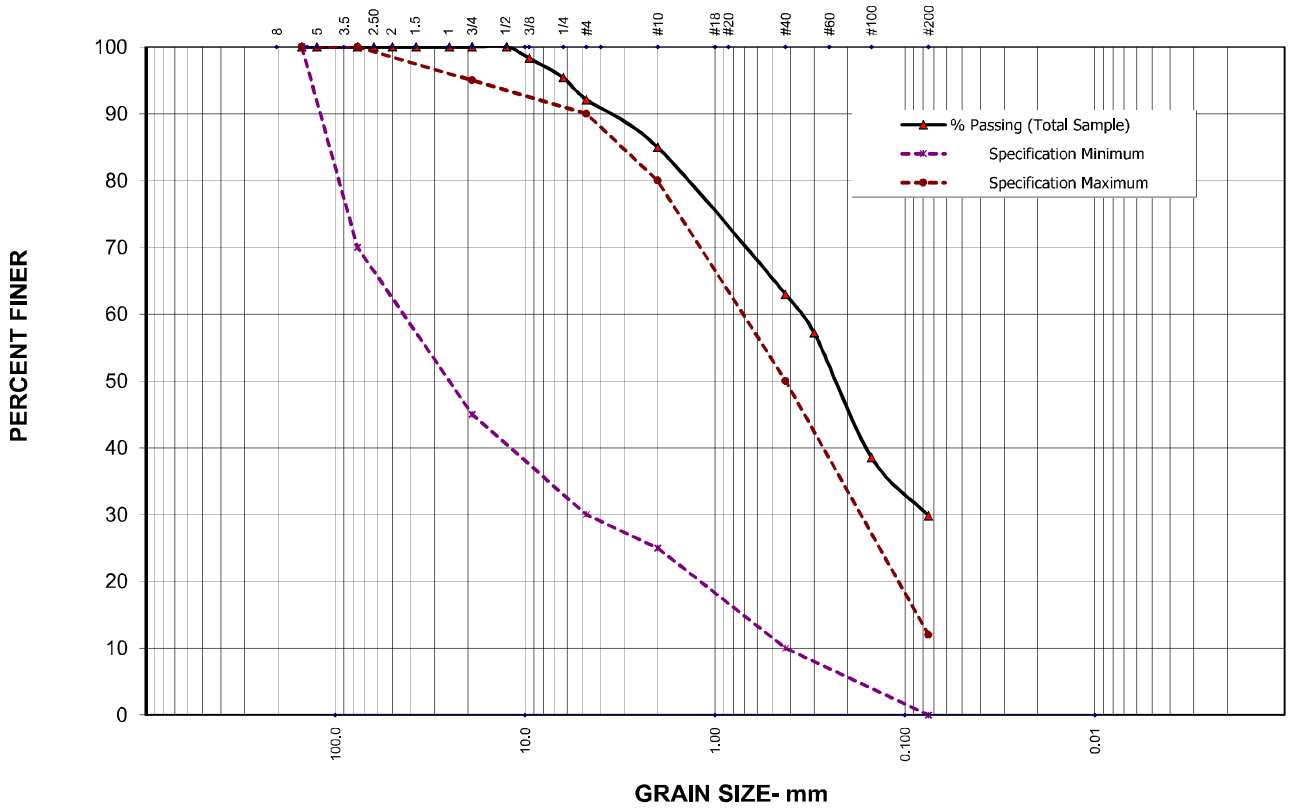
Remarks:

Tested By: C. Klopfer Date: 1/24/2017
Reviewed By: BDO Date: 1/24/2017

J2C136, 5-28-10, Rev. 9

GRAIN SIZE DISTRIBUTION TEST REPORT

ASTM TEST METHOD: D422



% Cobbles	% Gravel	Coarse	Medium	Fine	% Fines	
		11.5	35.3	53.3	Silt (>0.002mm)	Clay (<0.002mm)
0	8	% Sand		62	30	

USCS Classification: Silty sand (SM)

Sieve Size (mm)	U.S. Sieve Size (in.)	Cumulative Wt. Retained	% Passing (Total Sample)	% Passing (Sand Portion)	Specification Minimum	Specification Maximum
150.0	6"	0.00	100		100	100
125.0	5"	0.00	100			
76.3	3"	0.00	100		70	100
62.5	2.5"	0.00	100			
50.0	2"	0.00	100			
37.5	1.5"	0.00	100			
25.0	1"	0.00	100			
19.0	3/4"	0.00	100		45	95
12.5	1/2"	0.00	100			
9.5	3/8"	3.52	98			
6.3	1/4"	9.52	95			
4.75	#4	16.37	92		30	90
2.00	#10	31.15	85		25	80
0.425	#40	76.64	63		10	50
0.300	#50	88.68	57			
0.150	#100	127.25	39			
0.075	#200	145.32	30		0	12

Total Dry Wt. 207.09 g
Moisture Content 14 %

Project:	**Addition to Campus Center North**	Project No.:	**J2165193**	Date:	**3/7/2017**
City:	Purchase, New York	Specification:	Terracon Structural Fill	Report No:	J2165193.0002
Source:	B-1	Sampled from:	5 to 7 feet (Fill)		

Terracon

201 Hammer Mill Road
Rocky Hill, CT 06067
860-721-1900 (p) 860-721-1939 (f)
http://www.terracon.com/

Remarks:

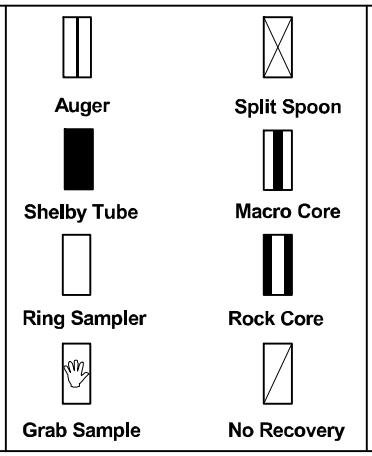
Tested By: C. Klopfer Date: 1/24/2017
Reviewed By: BDO Date: 1/24/2017

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING



WATER LEVEL

Water Initially Encountered

Water Level After a Specified Period of Time

Water Level After a Specified Period of Time

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength, Qu, psf**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or 1 > Cc > 3 [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or 1 > Cc > 3 [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

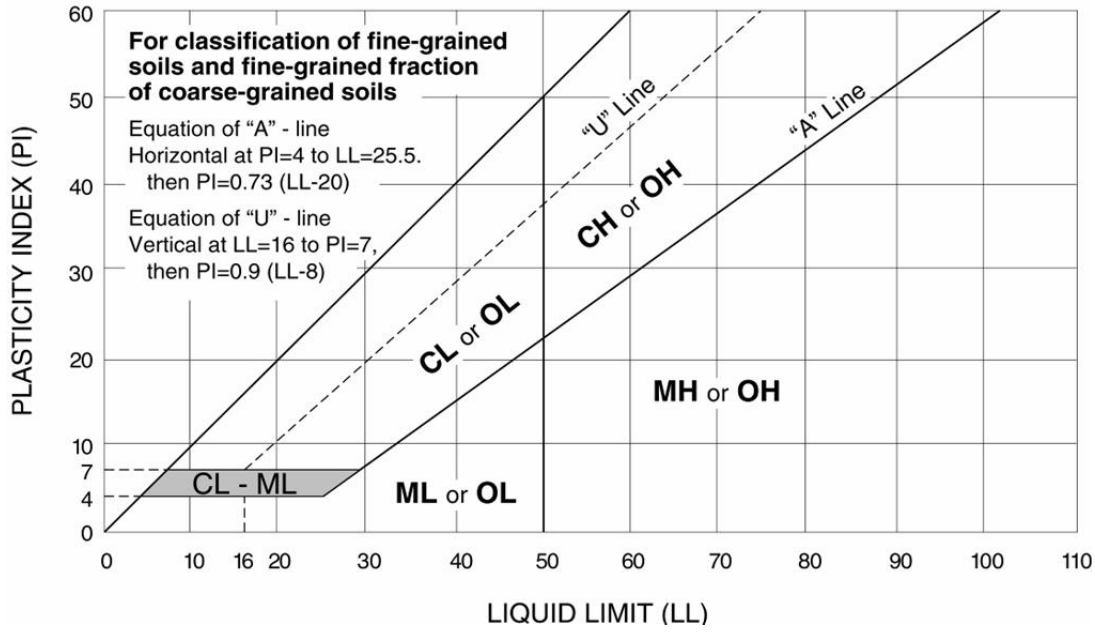
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

Exhibit C-2

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Project information.
2. Work covered by Contract Documents.
3. Work under separate Contracts.
4. Access to site.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

B. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: SUNY Purchase College, Café Addition and Renovation

1. Project Location: 735 Anderson Hall Road, Purchase, NY 10577.

B. Owner: SUNY Purchase College.

C. Client: Chartwells.

D. Architect: The Contract Documents were prepared for Project by Phase Zero Design, Simsbury, CT.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of the following:

1. New one-story addition to the Student Dining Commons.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 SCHEDULE

A. General: The Contractor shall prepare a detailed construction schedule, to be submitted to the Owner, Engineer, and Owner's Representative for review and approval. The schedule must clearly demonstrate the proper sequencing of construction activities.

1.6 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner will award a separate contract for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

1. Roofing:

a. New SBS modified bituminous membrane roofing, roof edge blocking and fascia, as part of adjacent reroofing project.
b. Roof penetrations and patching of membrane roofing on existing building.
c. Roof penetrations on new addition.
d. This Contract includes furnishing and installation of all roof drains in new construction.

2. Millwork.

a. This Contract includes furnishing and installation of wood blocking, conduit, plumbing and electrical systems for the installation of millwork by separate Contract.
b. This Contract includes furnishing and installation of plastic laminates on surfaces for walls and soffits.

3. Furniture, fixtures and equipment.

a. This Conract includes all mechanical, electrical and plumbing connections for food service equipment and walk-in refrigeration units.
b. This Contract includes furnishing and installing all hoods.

4. Data/Low Voltage: Data cabling, security, cameras, Wi-Fi, and security access (card readers) for doors.

a. This Contract includes furnishing and installation of infrastructure (pathways and power for devices) for installation of data and low voltage systems.

C. Subsequent Work: Owner will bid and award separate contracts for the following additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory Work under this Contract as indicated.

1. Room signage.

1.7 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Confine the parking of workmen's and construction vehicles, and the storage of construction materials to a designated staging area determined by the Owner.
2. Owner Occupancy: Allow for Owner occupancy of Project site.
3. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.8 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits, unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.9 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated.

1. Weekend Hours: Coordinate with Owner.
2. Hours for Utility Shutdowns: Coordinate with Owner.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted on site.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.10 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 48-division format and CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

E. In general, the Specifications will describe the quality of the work and the Drawings, the extent of the work. The Drawings and Specifications are cooperative and supplementary; however, each item of the work is not necessarily mentioned in both the Drawings and the Specifications. All work necessary to complete the project, so described, is to be included in this Contract.

F. In case of disagreement between the Drawings and Specifications, or within either document itself, the Architect shall interpret the Documents to require the better quality or greater quantity of work for the Owner that can reasonably be construed therefrom. Any work performed by the Contractor without consulting the Architect, when the same requires a decision, shall be performed at the Contractor's risk.

1.11 CODES, STANDARDS AND PERMITS

A. All work under this contract shall conform to all codes and standards in effect as of the date of receipt of Bids which are applicable to this Project. All work shall also conform to specific requirements and interpretations of local authorities having jurisdiction over the Project. These Codes, standards, and authorities are referred to collectively as "the governing codes and authorities" and similar terms throughout the Specifications. Determination of applicable codes and standards and requirements of the authorities having jurisdiction shall be the responsibility of the Contractor; as shall be the analysis of all such codes and standards in regard to their applicability to the Project for the purposes of determining necessary construction to conform to such code requirements, for securing all approvals and permits necessary to proceed with construction, and to obtain all permits necessary for the Owner to occupy the facility for their intended use. In the case of conflicts between the requirements of different codes and standards, the most restrictive or stringent requirements shall be met.

B. The codes that were used in the design of this Project are as follows:

1. New York State Uniform Fire Prevention and Building Code (the Uniform Code) including the following:

   a. 2015 International Building Code (IBC)
   b. 2015 International Mechanical Code (IMC)
   c. 2015 International Plumbing Code (IPC)
   d. 2015 International Energy Conservation Code (IECC)
   e. 2015 International Fire Code (IFC)
   f. 2014 National Electric Code
   g. 2009 ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
   h. New York State 2017 Uniform Code Supplement
   i. 2016 Supplement to the New York State Energy Conservation Construction Code (Revised August 2016)

2. Current New York Public Health Code.
3. Current OSHA.
4. Title III of the Americans with Disabilities Act (ADA) including the 2010 ADA Standards for Accessible Design.

C. Code Enforcement and Approvals: Secure and pay for the general building permit for the work,and conform to all conditions and requirements of the permit and code enforcement authorities.

D. Identify all permits (other than general building permit) required from authorities having jurisdiction over the Project for the construction and occupancy of the work. Prepare the necessary applications and submit required plans and documents to obtain such permits in a timely manner. Permit fees to be paid by the Subcontractor.

1. Display all permit cards as required by the authorities, and deliver legible photocopies of all permits to the Owner promptly upon their receipt.
2. Arrange for all inspections, testing and approvals required for all permits. Notify the Owner and Architect at least three business days in advance, so they may arrange to observe.
3. Comply with all conditions and provide all notices required by all permits.
4. Perform and/or arrange for and pay for all testing and inspections required by the governing codes and authorities, other than those provided by the Owner, and notify the Owner and Architect of such inspections at least three business days in advance, so they may arrange to observe.
5. Where inspecting authorities require corrective work in conjunction with applicable codes and authorities, promptly comply with such requirements, except in cases where such requirements clearly exceed the requirements of the Contract Documents, in which case proceed in accordance with the procedures for modifications to the Work established in the Contract Documents.

1.12 OCCUPATIONAL SAFETY AND HEALTH ACT

A. The Contractor and each Subcontractor shall comply with the requirements of the Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, including all standards and regulations which have been promulgated by the Governmental Authorities which administer such Acts. Said requirements, standards and regulations are incorporated herein by reference.

B. The Contractor and each Subcontractor shall comply with said regulations, requirements and standards and require and be directly responsible for compliance therewith on the part of his agents, employees material men and Subcontractors; and shall directly receive and be responsible for all citations, assessments, fines or penalties which may be incurred by reason of his agents, employees, material men or Subcontractors failing to so comply.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Chilled Water Booster Pump.

1. Furnish and install chilled water booster pump. See drawings for additional scope clarification.

B. Alternate No. 2: Heat Trace.

1. Furnish and install heat trace of sprinkler piping within cathedral ceiling. See drawings for additional scope clarification.

C. Alternate No. 3: Transfer Switch.

1. Furnish and install manual transfer switch and outside connect. See drawings for additional scope clarification.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

    a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    b. Requested substitution provides sustainable design characteristics that specified product provided.
    c. Substitution request is fully documented and properly submitted.
    d. Requested substitution will not adversely affect Contractor's construction schedule.
    e. Requested substitution has received necessary approvals of authorities having jurisdiction.
    f. Requested substitution is compatible with other portions of the Work.
    g. Requested substitution has been coordinated with other portions of the Work.
    h. Requested substitution provides specified warranty.
    i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:

1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions" or similar form prepared by Architect.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 10 days after receipt of Proposal Request, submit a quotation to the Architect, estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by first submitting a “Request for Information” to the Architect. This request will be responded to by the Architect, wherein the Contractor may submit a Change Order Proposal.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

C. Unit-Price Adjustment: See Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, the Contractor shall issue a Change Order for signature of Owner on AIA Document G701 or similar form.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.
c. Contractor's Construction Schedule.

2. Submit the Schedule of Values to the Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section. For major trades with line item values greater than $25,000, provide a separate line item for units of work within each trade with a value not exceeding $25,000.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Submit draft of AIA Document G702 and AIA Document G703 Continuation Sheets.
3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value.

1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.

a. Include separate line items under Contractor and principal subcontracts for LEED documentation and other Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
b. Include the following mandatory line items:

1) Mobilization.
2) Demobilization.
3) Builders Risk Insurance.
4) Bonds.
5) Coordination Drawings.
6) Scheduling.
7) Commissioning.
8) Project record documents.
9) Operation and Maintenance manuals.
10) Field Engineering.
11) Daily Building Cleanup.
12) Safety Program.
13) Full-Time Project Manager.
14) Full-Time Project Superintendent.
15) Field Offices.
16) Dumpsters.
17) Cold Weather Protection.
18) Temporary Heat.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

1. Prepare a draft of each Application for Payment and review with the Architect prior to submission of final Application. The draft copy shall be typewritten and include the application number and date.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.

2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire Owner's insurance.
17. OSHA training certificates.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Contractor’s use of Architect’s CAD Files.
4. Requests for Information (RFIs).
5. Project meetings.

B. The Contractor and each Subcontractor shall participate in coordination requirements.

C. Related Sections include the following:

1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services.
3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 10 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Keep list current at all times, resubmit upon update.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
5. No claim for additional compensation or extension of Contract Time will be permitted for conditions resulting from lack of coordination.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Preinstallation conferences.
6. Progress meetings.
7. Startup and adjustment of systems.
8. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
b. Indicate required installation sequences.
c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

2. Sheet Size: At least 24 by 36 inches but no larger than 30 by 42 inches at a scale suitable for presentation of the information.
3. Number of Copies: Submit a sufficient number of copies of each submittal for Architect and Consultant to retain one copy each.

a. Submit one additional copy where Coordination Drawings are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
5. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.

b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Division 01 Section "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
b. Digital Data Software Program: Drawings are available in
c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

1.7 CONTRACTOR’S USE OF ARCHITECT’S CAD FILES

A. General: At the Contractor’s written request, a copy of the Architect’s CAD files will be provided for the Contractor’s use in preparing Coordination Drawings for Project.

1.8 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.9 REQUESTS FOR INFORMATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI, to the Architect, in the form specified.

1. RFIs shall originate with Contractor or Subcontractor. RFIs submitted by entities other than the Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Subcontractor.
4. Name of Architect.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Hard-Copy RFIs:

1. Identify each page of attachments with the RFI number and sequential page number.

D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow five working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for approval of Contractor's means and methods.
d. Requests for coordination information already indicated in the Contract Documents.
e. Requests for adjustments in the Contract Time or the Contract Sum.
f. Requests for interpretation of Architect's actions on submittals.
g. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log biweekly. Include the following:

1. Project name.
2. Name and address of Architect.
3. RFI number including RFIs that were dropped and not submitted.
4. RFI description.
5. Date the RFI was submitted.
6. Date Architect's response was received.
7. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

G. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.10 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda and distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved and distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.

c. Critical work sequencing and long-lead items.
d. Designation of key personnel and their duties.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for RFIs.
g. Procedures for testing and inspecting.
h. Procedures for processing Applications for Payment.
i. Distribution of the Contract Documents.
j. Submittal procedures.
k. Preparation of Record Documents.
l. Use of the premises.
m. Work restrictions.
n. Owner's occupancy requirements.
o. Responsibility for temporary facilities and controls.
p. Construction waste management and recycling.
q. Parking availability.
r. Office, work, and storage areas.
s. Equipment deliveries and priorities.
t. First aid.
u. Security.
v. Progress cleaning.
w. Working hours.

3. Minutes: The Contractor shall record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. The Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility problems.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written recommendations.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.

w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Attend progress meetings at interval determined by the Architect. Dates of meetings may coincide with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Deliveries.
4) Access.
5) Site utilization.
6) Temporary facilities and controls.
7) Work hours.
8) Hazards and risks.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.
13) RFIs.
14) Status of proposal requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

3. Minutes: The Contractor shall record and distribute the meeting minutes.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes.

1. Attendees: In addition to representatives of Owner and Architect, each Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Deliveries.
4) Access.
5) Site utilization.
6) Temporary facilities and controls.
7) Work hours.
8) Hazards and risks.
9) Progress cleaning.
10) Quality and work standards.
11) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

F. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.

d. Requirements for preparing operations and maintenance data.
e. Requirements for delivery of material samples, attic stock, and spare parts.
f. Requirements for demonstration and training.
g. Preparation of Contractor's punch list.
h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
i. Submittal procedures.
j. Coordination of separate contracts.
k. Owner's partial occupancy requirements.
l. Installation of Owner's furniture, fixtures, and equipment.
m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Daily construction reports.
4. Material location reports.
5. Field condition reports.
6. Special reports.
7. Certified payroll records.

B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
4. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Float time belongs to Owner.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

G. Major Area: A story of construction, a separate building, or a similar significant construction element.

H. Milestone: A key or critical point in time for reference or measurement.

I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

J. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. Two paper copies.

B. Qualification Data: For scheduling consultant.

C. Preliminary Network Diagram: Submit two opaque copies, large enough to show entire network for entire construction period. Show logic ties for activities.

1. Include project calendar.

D. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

E. CPM Reports: Concurrent with CPM schedule, submit three copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

F. Daily Construction Reports: Submit two copies at weekly intervals, to the Owner's Representative.

G. Material Location Reports: Submit two copies at monthly intervals, to the Owner's Representative.

H. Field Condition Reports: Submit two copies at time of discovery of differing conditions, to the Architect.

I. Special Reports: Submit two copies at time of unusual event, to the Architect.

J. Certified Payroll Records: Submit two copies at weekly intervals to the Owner's Representative.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct a conference at Project site with Architect to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports. Provide sample of CPM schedule format.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Review delivery dates for Owner-furnished products.
4. Review schedule for work of Owner's separate contracts.
5. Review time required for review of submittals and resubmittals.
6. Review requirements for tests and inspections by independent testing and inspecting agencies.
7. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
8. Review and finalize list of construction activities to be included in schedule.
9. Review submittal requirements and procedures.
10. Review procedures for updating schedule.
11. Establish mandatory milestone dates and finish dates within each phase.

C. Review and approval of the Contractor's Construction Schedule is advisory only and does not relieve the Contractor of the responsibility for completing the work within the Contract time.

1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

C. Calendar: Compile a project calendar for use in scheduling. Incorporate all limitations on working days and working hours, including the following:

1. Legal Holidays.

2. Other non-working days determined by the Contractor.
3. Optional working days determined by the Contractor.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 10 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
4. Startup and Testing Time: Include not less than one day for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Subcontract awards.
b. Submittals.
c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Startup and placement into final use and operation.

7. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

a. Structural completion.
b. Permanent space enclosure.
c. Completion of mechanical installation.
d. Completion of electrical installation.
e. Substantial Completion.

8. Other Constraints: Include the following specific activities in each trade in each phase.

a. Interface between Contractor and Subcontractor.
b. Electrical connections to each piece of equipment.
c. Mechanical connections to each piece of equipment.
d. Concrete finishing.
e. Site work constraints on other activities.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

F. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Preliminary Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a computerized, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for commencement of the Work.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing and commissioning.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the Schedule of Values).

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float time.
7. Changes in the Contract Time.

G. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

    a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (refer to special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial Completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before submission of Application for Payment.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.
4. Evaluate progress of the work jointly with the Owner at the end of each week to show progress and identify conflicts.

C. Distribution: Distribute two copies each of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule.
4. Division 01 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
5. Division 01 Section "Closeout Procedures" for submitting warranties.
6. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
7. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
8. Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.
9. Divisions 02 through 33 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's and responsive action. Submittals may be rejected for not complying with requirements.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: Submit concurrently with preliminary network diagram. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
4. Update the submittals schedule periodically as the work progresses. Submit concurrently with each Application for payment.
5. Utilize a computerized program for tracking submittals. Submit the following reports bi-weekly:

    a. Complete list of reviewed submittals.
    b. Listing of submittals to date.
    c. Listing of approved submittals.
    d. Listing of rejected submittals.
    e. Listing of submittals returned for correction.
    f. List of outstanding submittals.

6. At the request of the Architect provide reports capable of being sorted by the following criteria:

    a. Approved status.
    b. Subcontractor/Supplier.
    c. Submission date.
    d. Number of days late for return.
    e. Number of days under review.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    b. Digital Drawing Software Program: The Contract Drawings are available in Revit and Auto CAD.
    c. Contractor shall execute a data licensing agreement in an Agreement form attached at the end of this Section.
    d. The following digital data files will by furnished for each appropriate discipline:

        1) Floor plans.
        2) Reflected ceiling plans.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. Submittals received after 1:00 p.m. will be considered as received the following working day. Submittals that are incomplete shall not be considered submitted until all pertinent information is received in accordance with this Section. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow two weeks for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Subcontractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow two weeks for review of each resubmittal.

    a. Resubmittals will be reviewed no more than two times at the Owner’s expense. Resubmittals which fail to comply with Contract requirements will be reviewed at the Contractor’s expense, based on an hourly rate of $150 per hour, not to exceed $1,200 for each subsequent submittal.
    b. The Owner reserves the right to deduct said reimbursement from the Contractor’s application for payment on a monthly basis.

4. Concurrent Consultant Review: Submittals may be transmitted simultaneously to Architect and to Architect's consultants, as required. Allow two weeks for review of each submittal. Consultant will return submittal to Architect before being returned to Contractor.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall be formatted as follows: **HUB-064023.01-8-2.4A.**

        1) Project Name-
        2) Specification Section number followed by a decimal point and then a sequential number for the submittal number of that product-
        3) Specification Section page number-
        4) Paragraph number where product is specified.

5) Resubmittals shall include a numerical suffix after submittal number as follows:

a) **HUB-064023.02-8-2.4A.**

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Architect, containing the following information:

a. Project name.
b. Date.
c. Name and address of Architect.
d. Name of Contractor.
e. Name of firm or entity that prepared submittal.
f. Names of subcontractor, manufacturer, and supplier.
g. Category and type of submittal.
h. Submittal purpose and description.
i. Specification Section number and title.
j. Specification paragraph number or drawing designation and generic name for each of multiple items.
k. Drawing number and detail references, as appropriate.
l. Location(s) where product is to be installed, as appropriate.
m. Related physical samples submitted directly.
n. Indication of full or partial submittal.
o. Transmittal number, numbered consecutively.
p. Submittal and transmittal distribution record.
q. Other necessary identification.
r. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

a. Project name.
b. Number and title of appropriate Specification Section.
c. Manufacturer name.
d. Product name.

E. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Subcontractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:

a. Project name.
b. Date.
c. Name and address of Architect
d. Name and address of Subcontractor.
e. Name and address of supplier.
f. Name of manufacturer.
g. Submittal number or other unique identifier, including revision identifier.
h. File name shall be formatted as follows: **HUB-064023.01-8-2.4A.**

1) Project Name-

2) Specification Section number followed by a decimal point and then a sequential number for the submittal number of that product-
3) Specification Section page number-
4) Paragraph number where product is specified.
5) Resubmittals shall include a numerical suffix after submittal number as follows:

a) **HUB-064023.02-8-2.4A.**

i. Drawing number and detail references, as appropriate.
j. Location(s) where product is to be installed, as appropriate.
k. Other necessary identification.

4. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

a. Transmittal Form: Provide locations on form for the following information:

1) Project name.
2) Date.
3) Destination (To:).
4) Source (From:).
5) Names of subcontractor, manufacturer, and supplier.
6) Category and type of submittal.
7) Submittal purpose and description.
8) Specification Section number and title.
9) Drawing number and detail references, as appropriate.
10) Transmittal number, numbered consecutively.
11) Submittal and transmittal distribution record.
12) Remarks.
13) Signature of transmitter.

F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked “Approved” or “Approved as Corrected.”

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's written recommendations.
    b. Manufacturer's product specifications.
    c. Manufacturer's installation instructions.
    d. Standard color charts.
    e. Manufacturer's catalog cuts.
    f. Wiring diagrams showing factory-installed wiring.
    g. Printed performance curves.
    h. Operational range diagrams.
    i. Mill reports.
    j. Standard product operation and maintenance manuals.
    k. Compliance with specified referenced standards.
    l. Testing by recognized testing agency.
    m. Application of testing agency labels and seals.
    n. Notation of coordination requirements.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.

d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data**, unless submittal based on Architect's digital data drawing files is otherwise permitted**.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following formats:

a. PDF electronic file.
b. Submit one paper copy of shop drawings indicated. Architect will retain hard copy, scan and return electronically. Mark up and retain one returned copy as a Project Record Drawing.

1) Submit all large format shop drawings (24x36 or larger) in paper copies:

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.
4. Number of Copies: Submit five copies of product schedule or list, unless otherwise indicated. Architect will return four copies.

    a. Mark up and retain one returned copy as a Project Record Document.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Number of Copies: Submit five copies of subcontractor list, unless otherwise indicated. Architect will return four copies.

    a. Mark up and retain one returned copy as a Project Record Document.

J. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

K. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

L. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

M. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

N. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."

O. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

P. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

Q. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

R. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

S. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

T. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

U. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

V. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

W. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

X. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

Y. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

Z. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

AA. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

BB. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

CC. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

DD. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.

2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

EE. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

FF. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

2.2 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit five copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. "Approved": The portion of Work covered by the submittal may proceed provided it complies with the Contract Documents.
2. "Approved as Corrected": The portion of Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal, and with the Contract Documents.
3. "Not Approved" or "Revise and Resubmit": Revise or prepare a new submittal in accordance with notations; resubmit. Do not proceed with that portion of the Work covered by the submittal.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
3. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed by the Architect, unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made by the Owner.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for commencement of the Work.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency and special inspector to conduct special tests and inspections required by the New York State Building Code and by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

Statement of Special Inspections

Project: *SUNY Purchase – Hub Addition and Renovations*

Location: *735 Anderson Road – Purchase, New York*

Owner: *SUNY – State of New York*

Design Professional in Responsible Charge: *Szewczak Associates Consulting Engineers*

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following disciplines:

☒ Structural ☐ Mechanical/Electrical/Plumbing

☐ Architectural ☐ Other: _____

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *Report to be issued for each day of inspection.* or ☐ per attached schedule.

Prepared by:

Richard M. Szewczak, P.E.
(type or print name)

2/16/18
Signature Date

Design Professional Seal

Owner's Authorization:

Signature Date

Building Official's Acceptance:

Signature Date

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- ☒ Soils and Foundations
- ☒ Cast-in-Place Concrete
- ☐ Precast Concrete
- ☐ Masonry
- ☒ Structural Steel
- ☐ Cold-Formed Steel Framing
- ☐ Spray Fire Resistant Material
- ☐ Wood Construction
- ☐ Exterior Insulation and Finish System
- ☐ Mechanical & Electrical Systems
- ☐ Architectural Systems
- ☐ Special Cases

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. **Special Inspection Coordinator**	*To be Determined*	
2. Testing Agency	*To be Determined*	
3. Other Geotechnical Engineer		
4. Other		
5. Other		
6. Other		

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and testing technicians shall be provided if requested.

Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge deems it appropriate that the individual performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the *Agency Number* on the Schedule.

PE/SE	Structural Engineer – a licensed SE or PE specializing in the design of building structures
PE/GE	Geotechnical Engineer – a licensed PE specializing in soil mechanics and foundations
EIT	Engineer-In-Training – a graduate engineer who has passed the Fundamentals of Engineering examination

American Concrete Institute (ACI) Certification

ACI-CFTT	Concrete Field Testing Technician – Grade 1
ACI-CCI	Concrete Construction Inspector
ACI-LTT	Laboratory Testing Technician – Grade 1&2
ACI-STT	Strength Testing Technician

American Welding Society (AWS) Certification

AWS-CWI	Certified Welding Inspector
AWS/AISC-SSI	Certified Structural Steel Inspector

American Society of Non-Destructive Testing (ASNT) Certification

ASNT	Non-Destructive Testing Technician – Level II or III.

International Code Council (ICC) Certification

ICC-SMSI	Structural Masonry Special Inspector
ICC-SWSI	Structural Steel and Welding Special Inspector
ICC-SFSI	Spray-Applied Fireproofing Special Inspector
ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector

National Institute for Certification in Engineering Technologies (NICET)

NICET-CT	Concrete Technician – Levels I, II, III & IV
NICET-ST	Soils Technician - Levels I, II, III & IV
NICET-GET	Geotechnical Engineering Technician - Levels I, II, III & IV

Exterior Design Institute (EDI) Certification

EDI-EIFS	EIFS Third Party Inspector

Other

_____ _____

Soils and Foundations

Item	Agency # (Qualif.)	Scope
1. Shallow Foundations IBC 2015	*2*	*Observe preparation of existing subgrade. Verify compliance with requirements of the Contract Documents.*
	2	*Inspect final footing subgrades and bearing surfaces to confirm adequate bearing capacity and compliance with the Contract Documents.*
	2	*Observe removal of unsuitable material and preparation of subgrade prior to placement of controlled fill.*
2. Controlled Structural Fill IBC 2015 1705.6	*2*	*Perform sieve tests (ASTM D422 & D1140) and modified proctor tests (ASTM D1557) of each source of fill material.*
	2	*Inspect placement, lift thickness and compaction of controlled fill.*
	2	*Test density of fill by nuclear methods (ASTM D2922).*
	2	*Verify extent and slope of fill placement.*
3. Deep Foundations		
4. Load Testing		
4. Special Inspection Coordination	*1* *PE*	*Observe work and inspections. Verify that the assigned inspection agencies are conducting the inspections required. Verify inspection agent qualifications.*

Item	Agency # (Qualif.)	Scope
1. Reinforcement Installation (Including rebar, tendons, and post-tensioning ducts) IBC 2015 Table 1705.3 Item 1	*2 ACI-CCI*	*Inspect size, spacing, cover, and positioning of reinforcing steel in accordance with the requirements of the Contract Documents and reviewed Shop Drawings.*
	2 ACI-CCI	*Verify that reinforcement is accurately placed and adequately supported before concrete is placed, and is secured against displacement within tolerances listed above.*
	2 ACI-CCI	*Verify that reinforcing bars are free from mud, oil, concrete from previous placements, or other deleterious materials.*
	2 ACI-CCI	*Verify that bar lap splice dimensions and mechanical splices have been provided in accordance with the requirements of the Contract Documents and reviewed Shop Drawings.*
2. Reinforcing Steel Welding IBC 2015 Table 1705.3 Item 2	-	*(Not applicable)*
3. Anchor Rods and Other Embedments IBC 2015 Table 1705.3 Item 3&4	*2 ACI-CCI*	*Inspect size, positioning, and quantity of embedments. Observe concrete placement and verify proper consolidation around embedments.*
4. Use of Approved Concrete Mix Design IBC 2015 Table 1705.3 Item 5	*2 ACI-CCI*	*Review concrete batch tickets and verify compliance with approved mix design.* *1. Verify that water added at the site does not exceed that allowed by the approved mix design.* *2. Review admixtures on concrete batch tickets and verify compliance with approved mix design. Verify that quantities added do not exceed that allowed by the approved mix design.*
5. Sampling and Testing of Concrete and Shotcrete IBC 2015 Table 1705.3 Item 6		*Samples for strength tests shall be taken in accordance with ASTM C172 (ACI 318 Sect. 26.12) at frequency noted in Project Specifications.*
	2 ACI-CFTT	*Test concrete slump (ASTM C143), air-content (ASTM C231 or C173) and temperature (ASTM C1064) each time that concrete is sampled for strength tests.*
	2 ACI-STT	*Test concrete compressive strength (ASTM C31 & C39).*

Cast-in-Place Concrete (continued)

Item	Agency # (Qualif.)	Scope
6. Concrete and Shotcrete Placement IBC 2012 Table 1705.3 Item 7	*2* *ACI-CCI*	*Verify that concrete is conveyed and deposited in accordance with ACI 318-14 Section 26.5 and Project Specifications.*
7. Curing and Protection IBC 2015 Table 1705.3 Item 8	*2* *ACI-CCI*	*Concrete:* *Verify that concrete is cured and temperature maintained in accordance with Project Specifications and ACI 318-14 Section 26.5*
8. Prestressed Concrete IBC 2015 Table 1705.3 Item 9	-	*(Not applicable)*
9. Structural Precast Concrete IBC 2015 Table 1705.3 Item 10	-	*(Not applicable)*
10. In-situ Concrete Strength IBC 2015 Table 1705.3 Item 11	-	*(Not applicable.)*
11. Formwork Geometry IBC 2015 Table 1705.3 Item 12	*2* *ACI-CFTT*	*Verify that forms conform to shapes, lines and dimensions of the members as required by the Contract Documents.*
12 Non-Shrink Grout	*2* *ACI-CFTT*	*Tests: Test non-shrink grout specimens in accordance with the following:* *1. ASTM C 1107-02 Article 12.1 Consistency* *2. ASTM C 1107-02 Article 12.5 Compressive Strength:* *a. Test three cubes for compressive strength at each age (1, 3, 7 and 28 days).*
13 Special Inspection Coordination	*1* *PE*	*Periodically observe work. Verify that the assigned inspection agencies are conducting the inspections required. Independently verify the items specified in this Statement of Special Inspections during site observations.* *Verify inspection agent qualifications.*

Item	Agency # (Qualif.)	Scope
1. Fabricator Certification/ Quality Control Procedures IBC 2015 1704.2.5	*1*	*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 approved construction documents and referenced standards. Review the procedures for completeness and adequacy relative to the code requirements for the fabricator's scope of work. (1704.2.5)* *Alternatively, for AISC Certified Fabricators, obtain current evidence that fabricator is exempt from Special Inspections as provided for in IBC 2015 Section 1704.2.5.1.*
2. Material Certification AISC 360-10 Table N5.2	*1* *1* *2* *AWS-CWI*	*Review mill certificates for steel and ASTM certificates for bolts and weld material.* *Review material certifications for bolts, nuts and washers.* *Review material certificates for weld fill materials.*
3. Open Web Steel Joists	-	*(Not applicable.)*
4. Bolting AISC 360-10 Tables N5.6-1, N5.6-2, and N5.6-3	*2* *2*	*Review bolting operation and proper pretensioning of bolts utilized.* *Review fastener ASTM identification markings.*
5. Welding AISC 360-10 Tables N5.4-1, N5.4-2, and N5.4-3	*2* *AWS-CWI*	*Review welder's certifications.*
6. Shear Connectors AISC 360-10 Table N6.1	-	*(Not applicable.)*

Structural Steel (continued)

Item	Agency # (Qualif.)	Scope
7. Structural Details	*1,2*	*Review field installation of steel for conformance with Contract Documents.*
8. Metal Deck AISC 360-10 Table N6.1	*2* *AWS-CWI*	*Field inspection of installed deck and connection to structure and side lap connections.*
9. Special Inspection Coordinator	*1* *PE*	*Observe work prior to decking installation and when nearly complete for conformance to the Contract Documents. Independently verify the items specified in this Statement of Special Inspections during site observations.*

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections include the following:

1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
2. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Division 01 Section "Execution" for progress cleaning requirements.
4. Division 01 Section “Indoor Air Quality Requirements.”
5. Divisions 02 through 33 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the 2010 ADA Standards and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

C. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

    a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for demolition operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line and one facsimile line for field office.

1. Provide additional telephone lines for the following:

    a. Provide a dedicated telephone line for each facsimile machine.
    b. Provide one telephone line(s) for common use.

2. At each telephone, post a list of important telephone numbers.

    a. Police and fire departments.
    b. Ambulance service.
    c. Contractor's home office.
    d. Architect's office.
    e. Engineers' offices.
    f. Owner's office.
    g. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

J. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Pentium D or Intel CoreDuo, 3.0 GHz processing speed.
2. Memory: 4 gigabyte, minimum.
3. Disk Storage: 300 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
4. Display: 22-inch LCD monitor with 256-Mb dedicated video RAM.
5. Full-size keyboard and mouse.
6. Network Connectivity: 10/100BaseT Ethernet.
7. Operating System: Microsoft Windows XP Professional.
8. Productivity Software:

    a. Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook.
    b. Adobe Reader 7.0 or higher.
    c. WinZip 7.0 or higher.

9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds at each computer.
11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
12. Backup: External hard drive, minimum 40 gigabyte, with automated backup software providing daily backups.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment.

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification sign as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

F. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly.

1. Comply with Division 01 Section "Execution" for progress cleaning requirements.
2. Provide sufficient quantity of dumpsters at strategic locations within the Contract limit lines for collection of waste from the work of all Subcontractors.
3. Do not pass materials through open windows, or through window openings when any portion of the window remains in the opening.

G. Temporary Lifts and Hoists: The Contractor shall provide, operate and maintain in safe operating order facilities for hoisting materials, rubbish, employees and to otherwise carry out the Work. Truck cranes, fork lifts, man lifts and similar devices required for the performance of the Work by each Subcontractor shall be provided by the Subcontractor.

1. Provide temporary lifts and hoists that comply in all respects with the most stringent of all applicable Federal (including OSHA), state and local laws, rules, regulations, codes and ordinances, and provisions of Division 01 of this Specification.
2. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
3. The Contractor is responsible for engaging a structural engineer licensed in the State of New York to provide calculations evaluating all elevated floor structures for support of proposed temporary lifts and hoists equipment loads. Submit the calculations, signed and sealed by the Contractor’s structural engineer, to Architect.

H. Staging and Scaffolding: Where staging and scaffolding is required, the Contractor shall provide the entire installation.

1. Staging shall be of approved design, erected and removed by experienced stage builders and shall have all accident prevention devices required by State and local laws.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 01 Section "Summary."

C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

F. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

I. Temporary Enclosures: Provide all temporary enclosures for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Provide enclosures as required on the exterior or interior side of the building, whether the roof has been installed or not, and whether windows or doors have been installed or not, in order to protect the Work and allow Work to continue in accordance with the requirements of the Specifications. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

    a. Erect and maintain temporary enclosures and temporary heat during the months of November through March.

2. Install tarpaulins securely, with fire-retardant-treated wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
4. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.
5. Do not use new permanent doors and frames for temporary enclosures until finishing work is begun, and then only if carefully protected from damage. Prior to installation of permanent doors and frames, provide temporary wood or plywood doors with wood frames and proper hardware to make the doors self-closing.

    a. Close and lock all openings accessible from ground level at end of each day=s work to prevent entry of unauthorized persons.

J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Construct dustproof partitions with 2 layers of 3-mil polyethylene sheet on each side. Cover floor with 2 layers of 3-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Insulate partitions to provide noise protection to occupied areas.
4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
5. Protect air-handling equipment.
6. Weather strip openings.
7. Provide walk-off mats at each entrance through temporary partition.

K. Protection: Protect the Work at all times from damages. Provide all pumps, equipment and enclosures to ensure this protection.

1. Remove all snow and ice as may be required for proper protection and prosecution of the work.
2. Provide all shoring, bracing and sheeting as required for safety and for proper execution of work.
3. Protect all work from damage during cold weather. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, cease work and notify Architect. Repair and/or replacement of all work damaged from frost, freezing or any elements of the weather are the responsibility of the Contractor responsible for temporary protection of the Work.
4. Should high wind warnings be issued by the U.S. Weather Advisory Bureau, take every precaution to minimize danger to persons, to the Work, and to adjacent properties, including, but not limited to, removing all loose materials, tools and/or equipment from exposed locations, and removing or securing scaffolding or other temporary work.
5. Protect the building and the site from damage, loss or liability due to theft or vandalism when the work is not in progress at night, weekends, or holidays.
6. Exercise precaution for the protection of persons and property at all times. Observe the provisions of applicable laws and construction codes. Take additional safety and health measures, or cause such measures to be taken as reasonably necessary. Maintain guards on machinery, equipment and other hazards as set forth in the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable laws.
7. Protect and preserve in operating conditions all utilities traversing the work area. Repair all damages to any utility due to work performed under this Contract, the satisfaction of the Architect at no additional cost to the Owner.
8. Protect all existing and new finished surfaces against damage from work under this Contract. Restore or replace finishes that are damaged to their original condition, subject to approval by the Architect, and at no additional cost to the Owner.

L. Roof Protection: The Contractor shall protect all existing roof surfaces to prevent damage from selective demolition and new construction operations. Keep traffic on roof systems to a minimum, and permit traffic only as required to complete the work under this Contract.

1. Repair or replace roofing system components and substrates to their original condition where damaged by operations under this Contract. Comply with Specifications and/or roofing manufacturer's written recommendations for maintaining new and existing roofing warranties, subject to approval by the Architect, and at no additional cost to the Owner.

M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections include the following:

1. Division 01 Section "Substitution Procedures" for requests for substitutions.
2. Division 01 Section "References" for applicable industry standards for products specified.
3. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
4. Divisions 02 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise.

    a. Products salvaged or recycled from other projects are not considered new products.
    b. Products manufactured and stored for more than one year prior to the start date of this project are not considered new products.

3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
4. “Or Equal” Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

a. An item equal to that named or described in the specifications may be furnished; and an item shall be considered equal to the item so named or described if, in the opinion of the awarding authority: (1) it is at least equal in quality, durability, appearance, strength and design, (2) it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the said specifications.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification, or for purposes of evaluating “or equal” products.

1.4 ACTION SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Form: Tabulate information for each product under the following column headings:

a. Specification Section number and title.
b. Generic name used in the Contract Documents.
c. Proprietary name, model number, and similar designations.
d. Manufacturer's name and address.
e. Supplier's name and address.
f. Installer's name and address.
g. Projected delivery date or time span of delivery period.
h. Identification of items that require early submittal approval for scheduled delivery date.

3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.

a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.

4. Completed List: Within 90 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.

B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of

receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
3. Refer to Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Products:

a. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed equal product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

2. Manufacturers:

a. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed equal manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

3. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
4. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
5. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

6. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. General installation of products.
3. Progress cleaning.
4. Starting and adjusting.
5. Protection of installed construction.
6. Correction of the Work.

B. Related Sections include the following:

1. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
2. Division 01 Section "Closeout Procedures" for final cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Examination and Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

D. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of 7’-6” in spaces without a suspended ceiling.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Divisions 02 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
2. Division 07 Section "Penetration Firestopping" for patching fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Penetration of in-place construction necessary to permit installation or performance of other Work, including the removal of debris.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio. Structural elements include, but are not limited to the following:

1. Concrete foundation construction.
2. Bearing and retaining walls.
3. Lintels.
4. Structural decking.
5. Miscellaneous structural metals.
6. Interior and/or exterior load bearing masonry wall construction.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Piping, ductwork, vessels, and equipment.
4. Noise- and vibration-control elements and systems.
5. Roofing systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements of the Contractor for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. The Contractor is responsible for all costs associated with construction waste management and disposal.

C. Related Sections include the following:

1. Division 01 Section "Temporary Facilities and Controls" for environmental-protection measures during construction, and location of waste containers at Project site.
2. Division 01 Section “Indoor Air Quality Requirements.”

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Demolition Waste:

a. Asphalt paving.
b. Concrete.
c. Concrete reinforcing steel.
d. Brick.
e. Concrete masonry units.
f. Plywood and oriented strand board.
g. Wood paneling.
h. Wood trim.
i. Structural and miscellaneous steel.
j. Rough hardware.
k. Roofing.
l. Insulation.
m. Doors and frames.
n. Door hardware.
o. Windows.
p. Glazing.
q. Metal studs.
r. Gypsum board.
s. Acoustical tile and panels.
t. Carpet.
u. Carpet pad.
v. Cabinets.
w. Plumbing fixtures.
x. Piping.
y. Supports and hangers.
z. Valves.
aa. Sprinklers.
bb. Mechanical equipment.
cc. Refrigerants.
dd. Electrical conduit.
ee. Copper wiring.
ff. Lighting fixtures.
gg. Lamps.
hh. Ballasts.
ii. Electrical devices.
jj. Switchgear and panelboards.
kk. Transformers.

2. Construction Waste:

a. Masonry and CMU.
b. Lumber.
c. Wood sheet materials.
d. Wood trim.
e. Metals.
f. Roofing.

g. Insulation.
h. Carpet and pad.
i. Gypsum board.
j. Piping.
k. Electrical conduit.
l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.
5) Polystyrene packaging.
6) Wood crates.
7) Plastic pails.

1.5 REQUIREMENTS FOR CONSTRUCTION WASTE MANAGEMENT

A. The Contractor shall prepare and submit a Construction Waste Management Plan to the Owner and Architect for approval. The CWM Plan shall outline the provisions to be implemented by the Contractor and Subcontractors to recycle and salvage demolition and construction waste generated during the project.

B. Upon approval of the CWM Plan by the Owner and Architect, it shall be implemented by the Contractor and Subcontractors throughout the duration of the project, and documented in accordance with the Submittal Requirements below.

C. The Construction Waste Management Plan shall include, but not be limited to, the following components:

1. Listing of Targeted Materials: The contractor shall develop a list of the waste materials from the Project that will be targeted for reuse, salvage, or recycling. The following materials, at minimum, shall be accounted for (materials that will not be recycled shall be indicated as such):

a. Cardboard, paper, packaging
b. Clean dimensional wood, palette wood
c. Beverage containers
d. Concrete and/or Concrete Masonry Units (CMU)
e. Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
f. Drywall
g. Carpet and pad
h. Paint
i. Rigid Foam
j. Glass
k. Plastics

2. Landfill Information: The contractor shall provide the name and location of the landfill(s) where trash will be disposed of.
3. Recycling or Salvaging Facilities: The contractor shall provide the names and locations of the recycling or salvaging facilities where waste materials will be delivered.
4. Sorting Method: The contractor shall provide a description of the proposed means of sorting and transporting the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site for off-site sorting). Waste haulers using off-site sorting operations shall provide a

written description of the sorting process used, and their method for calculating project-specific recycling rates.

5. Packaging Waste: The contractor shall note whether suppliers will eliminate or take back packaging for major materials delivered to the site.
6. Implementation and Supervision: The contractor shall include provisions in the Construction Waste Management Plan for addressing conditions in the field that do not adhere to the CWM Plan, including provisions to rectify non-compliant conditions.
7. Additional Information: The contractor shall include any additional information deemed relevant to describe the scope and intent of the CWM Plan to the Owner and Architect.

D. Construction Waste Management and recycling requirements shall be incorporated into all Subcontractors' contracts.

1.6 SUBMITTAL REQUIREMENTS

A. Waste Management Plan: Submit 3 copies of plan within 30 days of date established for the Notice to Proceed.

B. Provide a monthly diversion summary and back-up documentation for where debris was taken.

1.7 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Qualification Data: For waste management coordinator.

1.8 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.9 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect and Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not permitted on Project site.

3.3 RECYCLING DEMOLITION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4 inch size.

C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

D. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

E. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

F. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

G. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.

H. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

I. Carpet Tile: Remove debris, trash, and adhesive.

1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

J. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.

K. Conduit: Reduce conduit to straight lengths and store by material and size.

L. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.5 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.6 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.7 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 01 Section "Execution" for progress cleaning of Project site.
3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
6. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
6. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
7. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

8. Submit test/adjust/balance records.
9. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.7 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.

e. Page number.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. HEPA vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean ducts, blowers, and coils if units were operated without filters during construction.
r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
s. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.

B. Related Sections include the following:

1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Sections include the following:

1. Division 01 Section "Closeout Procedures" for general closeout procedures.
2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Divisions 02 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up Record Prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and one of file prints.
3) Submit record digital data files and one set of plots.
4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit three paper-copy sets of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and three sets of prints.
3) Print each drawing, whether or not changes and additional information were recorded.

c. Final Submittal:

1) Submit one paper-copy set of marked-up record prints.
2) Submit record digital data files and three sets of record digital data file plots.
3) Plot each drawing file, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file with comment function enabled.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

    a. See Division 01 Section "Submittal Procedures" for requirements related to use of Architect's digital data files.
    b. Architect will provide data file layer information. Record markups in separate layers.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications as required.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file or scanned PDF electronic file(s) of marked-up miscellaneous record submittals as required.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

B. Related Sections include the following:

1. Division 01 Section "Project Management and Coordination" for requirements for preinstruction conferences.
2. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For instructors.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. Fire-protection systems, including fire alarm and fire-extinguishing systems.
2. Intrusion detection systems.
3. HVAC systems, including air-handling equipment, air distribution systems, and terminal equipment and devices.
4. HVAC instrumentation and controls.
5. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies, and motor controls.
6. Lighting equipment and controls.
7. Communication systems, including intercommunication, voice and data equipment.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.

c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project Record Documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning
    e. Procedures for preventive maintenance.
    f. Procedures for routine maintenance.
    g. Instruction on use of special tools.

8. Repairs: Include the following:

    a. Diagnosis instructions.
    b. Repair instructions.
    c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    d. Instructions for identifying parts and components.
    e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

    1. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

    1. Schedule training with Owner with at least seven days' advance notice.

C. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

D. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

SECTION 018119 – INDOOR AIR QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Microbial and fungal contamination control.
2. Indoor air quality and pollution control.
3. Heating, ventilating, and air conditioning.
4. Description of Indoor Air Quality (IAQ) Construction Plan.
5. IAQ Construction requirements.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 01 Section “Temporary Facilities and Controls” for temporary facility requirements.
2. Division 01 Section “Closeout Procedures” for final cleaning.

1.3 INDOOR AIR QUALITY

A. Goals: The Owner has set the following goals to maintain indoor air quality for jobsite operations for this Project, within the limits of the construction schedule, Contract sum, and utilizing available materials, equipment, products, and services.

1. Protect workers on-site from undue health risks during construction.
2. Prevent residual problems with indoor air quality in the completed building.

B. Product Emission Rate Standards: Test to ASTM D 5116 for Maximum Indoor Air Concentration Levels.

1. Formaldehyde:

   a. 0.03 parts per million where no other requirements are specified.
   b. 0.005 parts per million where products are specified as formaldehyde free.

2. Total VOC Emissions for Carpet Tile, Adhesives, and Sealers: 0.05 mg/m2 per hour.
3. 4 Phenyl Cyclohexene (4-PC) Particulate Emissions for Carpet: 1 part per billion.
4. Total Particulate Emission Rate Levels: 50 ug/m3.
5. Primary and Secondary Regulated Pollutants: Conform to USEPA, Code of Federal Regulations, Title 40, Part 50 National Air Ambient Air Quality Standard. Refer to EPA Web Site: http://www.epa.gov/epahome/rules.html#codified.
6. Other Pollutants not Listed: Not greater than 1/10 of Threshold Limit Value - Time Weighted Average (TLV-TWA) Industrial workplace standard.

C. Architectural Coatings - Volatile Organic Compound (VOC) Content Limits: Conform to US Environmental Protection Agency (EPA) Federal Register 48886/Vol. 63, No. 176 Friday, September 11, 1998/Rules and Regulations. Refer to EPA Web Site: http://www.epa.gov/.

1.4 SUBMITTALS

A. Indoor Air Quality Construction Plan: Within fourteen (14) days of Notice to Proceed, prior to any waste removal by the Subcontractor, the Subcontractor shall develop and submit for review an indoor air quality plan, including the following:

1. List of IAQ protective measures to be instituted on the site.
2. Schedule for inspections and maintenance of IAQ measures.

B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.

1. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

C. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of the work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air filtration system discharge.
4. Other dust-control measures.
5. Waste management plan.

D. Substitutions: If the Subcontractor elects to use procedures, materials, equipment or products that are not specified, but meet the intent of these specifications, submit an alternative solution for approval.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Do not use products in combination with or in contact with other products that can be identified as combining to form toxic fumes or sustained odors.

B. Do not use solvents within interior areas that may penetrate and be retained in absorptive materials such as concrete, gypsum board, wood, cellulose products, fibrous material, and textiles.

PART 3 - EXECUTION

3.1 GENERAL

A. Protect construction materials from contamination and pollution from contact with construction dust, debris, fumes, solvents, and other environmentally polluting materials.

B. Conduct regular inspection and maintenance of indoor air quality measures including ventilation system protection, and ventilation rate.

C. Use low-toxic cleaning supplies for surfaces, equipment, and worker's personal use. Options include soybean-based solvents and cleaning options and citrus-based cleaners.

D. Use safety meetings, signage, and subcontractor agreements to communicate the goals of the indoor air quality construction plan.

E. Clean spills immediately involving solvents or cleaners.

3.2 HEATING, VENTILATING, AND AIR CONDITIONING

A. The Contractor is required to meet or exceed the minimum requirements of the Sheet Metal and Air conditioning National Contractor's Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995, and the following:

1. Do not run HVAC system during course of construction unless the Owner has authorized the use of the permanent heating system. Seal ductwork intake and exhaust vents.
2. Heat, dehumidify and ventilate building during course of Work as necessary to maintain environmental conditions suitable for drying and curing materials and for prevention of conditions suitable for mold and mildew growth.

    a. Ventilate building removing moisture, dust, fumes, and odors.
    b. Temper and dehumidify air as needed to remove excess moisture.
    c. Refer to Division 01 Section "Temporary Facilities and Controls" for temporary heating requirements.

3.3 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.

2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

E. Perform, schedule, and sequence Work as required to limit conditions supporting formations of microbes, molds, and fungi.

1. Control water penetration, dampness, and humidity to prevent products not treated for exterior use from becoming soaked or damp.

B. When visible formations are observed and when formations completely removed by non-abrasive surface cleaning:

1. Remove and replace materials identified as food sources for microbes, molds, and fungi.
2. Correct conditions supporting microbial, mold, and fungal growth.

C. Remove interior products and finishes, identified as food sources, that have absorbed sufficient moisture to become damp whether or not microbial, mold, or fungal growth is observed. Products may include, but not be limited to, the following:

1. Gypsum board cores.
2. Organic materials composed of cellulose fiber or paper.
3. Materials containing sucrose or other binders identified supporting microbial growth.

D. Remove fibrous insulation materials subject to retaining moisture such as duct liner, insulation, and other materials that are made wet or damp and cannot immediately be made dry.

E. Repair of replace ductwork, pans, and other conditions where moisture condensation, water penetration, or drained water has caused damage to such materials.

1. Remove conditions that have become an environment for microbes, molds, or fungi.
2. Do not permit conditions leading to standing water.

F. Remedial Action: Notify Owner and Architect prior to beginning remedial action where continuation by hazardous chemicals, microbes, and fungi is suspected.

3.4 DUST CONTROL

A. Prevent construction dust from entering Owner occupied areas. Erect temporary partitions in accordance with Division 01 Section “Temporary Facilities and Controls.”

B. Levels of airborne respirable dust in excess of 15 mg/m3 are considered excessive. Should such levels be reached or exceeded, discontinue activities which are creating dust, clean all surfaces, and take action to reduce the level of dust being created to within acceptable limits.

END OF SECTION 018119

SECTION 020800
ASBESTOS ABATEMENT PROCEDURES

AT: SUNY PURCHASE COLLEGE –
HUB RENOVATION and ADDITION
735 ANDERSON HILL ROAD
PURCHASE, NEW YORK 10577

OWNER: SUNY PURCHASE ASSOCIATION –
HUB RENOVATION and ADDITION
735 ANDERSON HILL ROAD
PURCHASE, NEW YORK 10577

CONSULTANT: QUALITY ENVIRONMENTAL SOLUTIONS & TECHNOLOGIES, INC. (QUES&T)
1376 ROUTE 9
WAPPINGERS FALLS, NEW YORK 12590
PH. (845) 298-6031
FX. (845) 298-6251

BID ISSUE DATED: February 20, 2018

PART I – GENERAL

1.01 DESCRIPTION

A. All work under this contract shall be performed in strict accordance with the specifications and all applicable laws for asbestos removal projects. The Abatement Contractor shall furnish all labor, materials, supervision, services, insurance and equipment necessary for the complete and total removal of Asbestos-containing Materials (ACM) as described herein, in attachments to the specification, Job Specific Variance(s) and/or as directed by Mamaroneck UFSD (here-in-after the "Owner") and/or the Owners Representative(s) to support the to the following Mamaroneck UFSD projects:

- SUNY Purchase Association –
  Hub Renovation Project
  735 Anderson Hill Road
  Purchase, New York 10577

B. Abatement Contractor shall provide for personnel air monitoring to satisfy OSHA regulation 29 CFR Parts 1926.1101(f). All work performed shall be in strict accordance with applicable provisions and regulations promulgated under New York State Department of Labor, Industrial Code 56 (ICR-56).

C. The Abatement Contractor shall satisfy the requirements for asbestos projects issued by the New York State Department of Labor concerning licensing and certification; notification; equipment; removal and disposal procedures; engineering controls; work area preparation; decontamination and clean-up procedures; and personnel air monitoring.

D. The Abatement Contractor shall be responsible for submittal of asbestos project notification(s) and applicable fees to EPA and NYSDOL concerning this project. Project notification(s) shall be made for the cumulative total of ACM to be removed as required by ICR-56-3.4. Work practices for each individual work area established shall be consistent with the quantity of ACM contained within that work area as defined in ICR-56-2.

E. The scope of work under this contract shall include the following:

1. All asbestos-containing materials (ACM) shall be removed in accordance with these specifications. The Abatement Contractor is responsible for field verification of estimated quantities, locations and other site conditions that may affect work.

2. All fixed objects remaining within the work area(s) shall be protected as required by Title 12 NYCRR Section 56-7.10(b) and as described in these specifications.

3. The containerization, labeling and disposal of all asbestos waste in accordance with applicable city, state and federal regulations and these specifications.

4. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to, ceiling tiles, ceiling finishes, wall finishes and/or floor finishes, etc.

5. The Abatement Contractor shall be responsible for any and all demolition required to access materials identified in scope of work and on associated drawings.

6. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner(s) immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. If the Abatement Contractor removes additional asbestos prior to the order to proceed the additional work will not be acknowledged.

7. Permissible working hours shall be Monday through Friday 7:00 A.M. to 4:00 P.M. with one (1) hour for lunch and/or as defined by the Owner. Holidays shall be considered weekends and not included for working days. Upon written approval from the Owner, the Abatement Contractor may work past these hours. The Abatement Contractor will incur any and all costs associated for work performed beyond the defined schedule including, but not limited to: abatement activities, project/air monitoring, custodial/staffing labor, overtime, mobilizations, etc.

8. Buildings will be turned over to the Abatement Contractor as is. At that time, all electrical services and HVAC systems in the proposed work areas will be shut down. Electricity and water supply will be maintained in the building for use by the Abatement Contractor. The Abatement Contractor is responsible for securing all power in the work area(s) and establishing all temporary GFCI hookups necessary to complete his work.

9. The Abatement Contractor shall remove identified asbestos-containing floor coverings to the building substrate beneath; in areas indicted. Subsequent to final air clearances, the substrate(s) shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.

10. The Abatement Contractor must coordinate location of waste containers with the Facility and the Owner. Deliveries and storage of equipment must be coordinated with the Facility and the Owner.

11. All “Large” and “Small” asbestos abatement projects, as defined by 12 NYCRR56 shall not be performed while the building is occupied. The term “building” means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated portion of the building must contain exists that do not pass through the occupied portion(s) and ventilation systems must be physically separated and sealed at the isolation barriers.

1.02 PRE-CONTRACT SUBMITTALS

Within three (3) days after bids are opened, the three (3) apparent low bidders shall be required to submit the following documentation:

A. Resume': Shall include the following:

1. Provide a list of projects of similar nature performed within the past two (2) years and include the dollar value of all projects. Provide project references to include owner, consultant, and air monitoring firms' name, contact person, address, and phone number, include location of project and date of completion.

2. Abatement Contractor license issued by New York State Department of Labor for asbestos work in accordance with ICR-56-3.

3. A list of owned equipment available to be used in the performance of the project.

4. The number of years engaged in asbestos removal.

5. An outline of the worker training courses and medical surveillance program conducted by the Abatement Contractor.

6. A standard operating procedures manual describing work practices and procedures, equipment, type of decontamination facilities, respirator program, special removal techniques, etc.

7. Documentation to the satisfaction of the Owner pertaining to the Abatement Contractor's financial resources available to perform the project. Such data shall include, but not be limited to, the firm's balance sheet for the last fiscal year.

B. Citations/Violations/Legal Proceedings

1. Submit a notarized statement describing any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous asbestos abatement contracts. Briefly describe the circumstances citing the project and involved persons and agencies as well as the outcome of any actions.

2. Answer the question: "Has your firm or its agents been issued a Stop Work order on any project within the last two years?" If "Yes" provide details as discussed above.

3. Answer the question: "Are you now, or have you been in the past, a party to any litigation or arbitrations arising out of your performance on Asbestos Abatement Contracts?" If "Yes" provide details as discussed in 1. above.

4. Describe any liquidated damages assessed within the last two years.

C. Preliminary Schedule

1. Provide a detailed schedule including work dates, work shift times, estimate of manpower to be utilized and the start and completion date for completion of each major work area.

1.03 DOCUMENTATION

A. The Abatement Contractor shall be required to submit the following and receive the Consultant's approval prior to commencing work on this project:

1. Provide documentation of worker training for each person assigned to the project. Documentation shall include copies of each workers valid New York State asbestos handler certificates (for those employees who may perform asbestos removal), documentation of current respirator fit test and current OSHA required training and medical examination.

2. The attached "Asbestos Employee Medical Examination Statement" and "Asbestos Employee Training Statement" forms shall be completed, signed and submitted for each worker assigned to the project. Records of all employee training and medical surveillance shall be maintained for at least forty (40) years. Copies of the records shall be submitted to the Consultant prior to commencement.

3. The Abatement Contractor shall submit proof of a current, valid license issued by the New York State Department of Labor pursuant to the authority vested in the Commissioner by section 906 of the Labor Laws, and that the employees performing asbestos related work on this project are certified by the State of New York as required in Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York latest edition. Copies of all licenses shall be submitted prior to the commencement of the project.

4. The Abatement Contractor shall submit a written respiratory protection program meeting the requirements of 29 CFR 1910.134 to the Consultant.

5. The name, address, social security number and NYS DOL certificate number of the person(s) who will supervise the asbestos project.

6. The name and address of the deposit or waste disposal site or sites where the asbestos materials are to be deposited or disposed of. This site must be approved by the Owner. The manifesting procedure must also be specified.

7. The name, address and New York State Dept. of Environmental Conservation ID Number of any transporters that are to be used to transport waste.

8. A written Standard Operation Procedure (SOP) that is designed and implemented to maximize protection against human exposure to asbestos dust. The SOP shall take into consideration the workers, visitors, building employees, general public and environment. As a minimum the procedures must include the following:

   a. Security for all work areas on an around-the-clock basis against unauthorized access.

   b. Project organization chart including the phone numbers of at least two responsible persons who shall be authorized to dispatch men and equipment to the project in the event of an emergency; including weekends.

   c. Description of protective clothing and NIOSH approved respirators to be used.

   d. Description of all removal methods to be used, including HEPA air filtration and decontamination sequence with special emphasis on any procedure that may deviate from these specifications.

e. A list of manufacturers' certificates stating that all vacuums, negative air filtration equipment, respirators and air supply equipment meet OSHA and EPA requirements.

f. A list of all materials proposed to be furnished and used under this contract.

g. Emergency evacuation procedures in the event of fire, smoke or accidents such as injury from falling, heat exposure, electrical shock, etc.

h. The name, address and ELAP number of the New York State Department of Health Certified Analytical Testing Laboratory the Contractor proposes to use for the OSHA monitoring.

9. A detailed plan, in triplicate, for the phasing of the project, division of work areas and location of decontamination facilities, waste containers and temporary office.

10. Work schedule, identifying firm dates and completion for actual areas. Bar chart or critical path chart indicating phases is required.

B. The Abatement Contractor shall post their NYS DOL contractor's license and maintain a daily log documenting the dates and time of the following items within each personal decontamination unit:

1. Meetings; purpose, attendants, discussion (brief)

2. Sign-in and sign-out of all persons entering the work area including name, date, time, social security number, position or function and general description of daily activity.

3. Testing of barriers and enclosure systems using smoke tubes prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.

4. Inspection of all plastic barriers, twice daily, by the asbestos supervisor.

5. Loss of enclosure integrity; special or unusual events, barrier breaches, equipment failures, etc.

6. Daily cleaning of enclosures.

7. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.

C. Documentation with confirmation signature of Consultant's representative of the following shall be provided by the Abatement Contractor at the final closeout of the project.

1. Testing of barriers and enclosure systems using smoke tubes shall be performed prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.

2. Inspection of all plastic barriers.

3. Removal of all polyethylene barriers.

4. Consultant's inspections prior to encapsulation.

5. Removal of waste materials.

6. Decontamination of equipment (list items).

7. Consultant's final inspection/final air tests.

D. The Abatement Contractor shall provide records of all project information, to include the following which shall be submitted upon completion of the project and prior to approval of the Abatement Contractor's payment application:

1. The location and description of the abatement project.

2. The name, address and social security number of the person(s) who supervised the asbestos project.

3. Certified payroll documentation Pursuant to Article 8, Section 220 of the NYS Labor Law

4. Copies of EPA/NYSDOL Asbestos Certificates for all Workers and Supervisors employed on the Project.

5. Copies of Medical Approval and Respirator Fit-testing for all Asbestos Workers and Supervisors employed on the Project.

6. Copies of Abatement Contractors Daily Sign-In Sheets & Logs for persons entering and leaving the work area. – Title 12 NYCRR Part 56-7.3.

7. Copies of Abatement Contractor’s personal air sampling laboratory results.

8. The amounts and type of asbestos materials that was removed, enclosed, encapsulated, or disturbed.

9. The name and address of the deposit or waste disposal site or sites where the asbestos waste materials were deposited or disposed of and all related manifests, receipts and other documentation associated with the disposal of asbestos waste.

10. The name and address of any transporters used to transport waste and all related manifests, receipts and other documentation associated with the transport of asbestos waste.

11. All other information that may be required by state, federal or local regulations.

12. Copy of the Supervisor’s Daily Project Log of events as described in 1.03 B, above.

1.04 NOTIFICATIONS AND PERMITS

A. The Abatement Contractor shall be required to prepare and submit notifications to the following agencies at least ten (10) days prior to the commencement of the project:

1. Asbestos NESHAPS Contact
   U.S. Environmental Protection Agency
   NESHAPS Coordinator, Air Facilities Branch
   26 Federal Plaza
   New York, New York 10007
   (212) 264-7307

2. State of New York Department of Labor
   Division of Safety and Health
   Asbestos Control Bureau
   State Office Building Campus, Building 12, Room 454
   Albany, New York 12240

3. Owner(s): SUNY Purchase Association
   735 Anderson Hill Road
   Purchase, NY 10577
   ATTN: Patrick Savolskis
   Ph. (914) 251- 6990
   E-mail. Patrick.savolskis@purchaes.edu

4. Environmental Consultant(s): Quality Environmental Solutions & Technologies, Inc. (QuES&T)
   1376 Route 9
   Wappingers Falls, New York 12590
   ATTN: Larry Goldstein
   Ph. (845) 298-6031
   Fx. (845) 298-6251
   E-mail. lgoldstein@qualityenv.com

B. The notification shall include but not be limited to the following information:

1. Name and address of Owner.

2. Name, address and asbestos handling license number of the Abatement Contractor.

3. Address and description of the building, including size, age, and prior use of the building or area; the amount, in square feet or linear feet of asbestos material to be removed; room designation numbers or other local information where asbestos material is found, including the type of asbestos material (friable or non-friable).

4. Scheduled starting and completion dates for removal.

5. Methods to be employed in abating asbestos containing materials.

6. Procedures and equipment, including ventilating/exhaust systems, that will be employed to comply with the Code of Federal Regulation (CFR) Title 40, Part 61 of the U.S. Environmental Protection Agency.

7. The name and address of the carting company and of the waste disposal site where the asbestos waste will be deposited.

NOTE: Notifications shall be submitted using standard forms as may be used by the respective agency.

For DOL (NYS) include "Asbestos Project Notification" form (DOSH-483) with proper fee, if required. For EPA include "Notification of Demolition and Renovation"; 40 CFR Part 61.

C. The Abatement Contractor shall secure any permits required by the city, town, county, or state that may be required and the cost for obtaining the permit shall be included in his base bid.

D. The Abatement Contractor shall erect warning signs around the work space at every point of potential entry into the regulated work area in accordance with in accordance with 29 CFR 1926.1101(k)(7). Signs shall be posted at such a distance that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. These signs shall at minimum bear the following information:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY

In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

WEAR RESPIRATORS PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

E. The Abatement Contractor shall post at entrances to the work place and immediate adjacent areas, notifications to building occupants, which include the name and license number of the contractor, project location and size, amount and type of ACM, abatement procedures, dates of expected occurrence and name and address of the air monitor and laboratory in compliance with ICR 56-3.6.

F. The Abatement Contractor shall post a list of emergency telephone numbers at the job site which shall include the Owner's Representative, police, emergency squad, local hospital, Environmental Protection Agency, N.Y. State Department of Labor, Occupational Safety and Health Administration and the local Department of Health.

1.05 APPLICABLE STANDARDS

Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, applicable standards of the construction industry have the same force and effects (and are made a part of contract documents by reference) as if copied directly into contract documents, or as if published copies were bound herewith. Resolution of overlapping and conflicting requirements, which result from the application of several different industry standards to the same unit of work, shall be by adherence to the most stringent requirement.

A. Applicable standards listed in these Specifications form a part of this Specification and include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. ANSI:
   American National Standards Institute
   1430 Broadway
   New York, New York 10018

2. ASHRAE:
   American Society for Heating, Refrigerating
   and Air Conditioning Engineers
   1791 Tullie Circle NE
   Atlanta, Georgia 30329

3. ASTM:
   American Society for Testing and Materials
   1916 Race Street
   Philadelphia, Pennsylvania 19103

4. CFR
   Code of Federal Regulations Available
   from Government Printing Office
   Washington, District of Columbia 20402

5. CGA
   Compressed Gas Association
   1235 Jefferson Davis Highway
   Arlington, Virginia 22202

6. CS
   Commercial Standard of NBS
   (US Dept. of Commerce)
   Government Printing Office

7. EPA
   Environmental Protection Agency, Region II
   26 Federal Plaza
   New York, New York 10007
   Asbestos Coordinator - Room 802
   (212) 264-9538
   Part 61, Sub-Parts A & B
   National Emission Standard for Asbestos

8. FEDERAL SPECS
   Federal Specification (General Services Administration)
   7th and D Street, SW
   Washington, District of Columbia 20406

9. NBS
   National Bureau of Standards
   (US Department of Commerce)
   Gaithersburg, Maryland 20234

10. NEC
    National Electrical Code (by NFPA)

11. NFPA
    National Fire Protection Association
    Batterymarch Park
    Quincy, Massachusetts 02269

12. NIOSH
    National Institute for Occupational Safety and Health
    26 Federal Plaza
    New York, New York 10007

13. NYSDOH
    New York State Department of Health
    Bureau of Toxic Substance Assessment
    Room 359 - 3rd Floor
    Tower Building Empire State Plaza
    Albany, New York 12237

14. NYSDEC
    New York State Department of Environmental Conservation
    Room 136
    50 Wolf Road
    Albany, New York 12233-3245

15. NYSDOL
    State of New York Department of Labor
    Division of Safety and Health
    Asbestos Control Program
    State Campus
    Building 12
    Albany, New York 12240

16. OSHA
    Occupational Safety and Health Administration
    (US Department of Labor)
    New York Regional Office - room 3445
    1515 Broadway
    New York, New York 10036

17. UL

Underwriters Laboratories
333 Pfingsten Road
Northbrook, Illinois 60062

B. Federal Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA):

a. Asbestos Regulations
Title 29, Part 1910, of the Code of Federal Regulations.

b. Respiratory Protection
Title 29, Part 1910, Section 134 of the Code of Federal Regulations.

c. Construction Industry
Title 29, Part 1926, of the Code of Federal Regulations.

d. Access to Employee Exposure & Medical Records
Title 29, Part 1910, Section 20 of the Code of Federal Regulations.

e. Hazard Communication
Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.

f. Specifications for Accident Prevention Signs and Tags
Title 29, Part 1910, section 145 of the Code of Federal Regulations.

2. U.S. Environmental Protection Agency (EPA):

a. Asbestos Hazard Emergency Response Act (AHERA) Regulation Asbestos Containing Materials in Schools Final Rule & Notice Title 40, Part 763, Subpart E of the Code of Federal Regulations.

b. Worker Protection Rule
40 CFR Part 763, Subpart G, CPTS 62044, FLR 2843-9
Federal Register, Vol. 50, No. 134, 7/12/85, P28530-28540

c. Regulation for Asbestos
Title 40, Part 61, Subpart A of the Code of Federal Regulations

d. National Emission Standard for Asbestos
Title 40, Part 61, Subpart M (Revised Subpart B) of the Code of Federal Regulations

e. Resource Conservation and Recovery Act (RCRA) 1976, 1980
Hazardous and Solid Waste Amendments (HSWA) 1984
Subtitle D, Subtitle C

3. U.S. Department of Transportation (DOT):

a. Hazardous Substances: Final Rule Regulation 49 CFR, Part 171 and 172.

C. State Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. New York State Department of Environmental Conservation (DEC) Regulations regarding waste collection registration. Title 6, Part 364 of the New York State Official Compilation of Codes, Rules and Regulations - 6NYCRR 364.

2. New York State Right-To-Know Law

3. New York State Department of Labor Asbestos Regulations Industrial Code Rule 56.

D. Standards: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. American National Standards Institute (ANSI)

   a. Fundamentals Governing the Design and Operation of Local Exhaust Systems Publication Z9.2-79

   b. Practices for Respiratory Protection Publication Z88.2-80

E. Guidance Documents: Those that discuss asbestos abatement work or hauling and disposal of asbestos waste materials are listed below only for the Abatement Contractor's information. These documents do not describe the work and are not a part of the work of this contract.

EPA:

1. Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book) EPA560/5-85-024.

2. Asbestos Waste Management Guidance EPA 530-SW-85-007.

F. Patents and Royalties: The Abatement Contractor shall pay all royalties and/or license fees. The Abatement Contractor shall defend all suits and claims for infringement of any patent rights and save the Owner and Consultant harmless from loss including attorney fees on account thereof.

1.06 DEFINITIONS

As used in or in connection with these specifications the following are terms and definitions.

Abatement - Procedure to control release from asbestos material. This includes removal, encapsulation and enclosure.

Aggressive sampling - A method of sampling in which the person collecting the air sample creates activity by the use of mechanical equipment during the sampling period to stir up settled dust and simulate activity in that area of the building.

AIHA - The American Industrial Hygiene Association, 475 Wolf Ledges Parkway, Akron, Ohio 44311.

Airlock - A system for permitting entrance and exit while restricting air movement between a containment area and an uncontaminated area. It consists of two curtained doorways separated by a distance of at least three feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.

Air sampling - The process of measuring the content of a known volume of air collected during a specific period of time.

Amended water - Water to which a surfactant has been added.

Approved asbestos safety program - A program approved by the Commissioner of Health providing training in the various disciplines that may be involved in an asbestos project.

Area air sampling - Any form of air sampling or monitoring where the sampling device is placed at some stationary location.

Asbestos - Any naturally occurring hydrated mineral silicate separable into commercially usable fibers, including chrysotile (serpentine), amosite (cumingtonite-gunerite), crocidolite (riebeckite), tremolite, anthophyllite and actinolite.

Asbestos contract - An oral or written agreement contained in one or more documents for the performance of work on an asbestos project and includes all labor, goods and service.

Asbestos handler - An individual who installs, removes, applies, encapsulates, or encloses asbestos or asbestos material, or who disturbs friable asbestos. Only individuals certified by NYS Department of Labor shall be acceptable for work under this specification.

Asbestos handling certificate - A certificate issued by the Commissioner of Labor of the State of New York, to a person who has satisfactorily completed an approved asbestos safety program.

Asbestos project - Work undertaken by a contractor which involves the installation, removal, encapsulation, application or enclosure of any ACM or the disturbance of friable ACM.

Asbestos Safety Technician (AST) - Individual designated to represent the Consultant, perform third party monitoring and perform compliance monitoring at the job site during the asbestos project.

Asbestos waste material - Asbestos material or asbestos contaminated objects requiring disposal.

Authorized visitor - The building owner, his or her representative or any representative of a regulatory or other agency having jurisdiction over the project.

Background level monitoring - A method used to determine ambient airborne concentrations inside and outside of a building or structure prior to starting an abatement project.

Building owner - The person in whom legal title to the premises is vested unless the premises are held in land trust, in which instance Building Owner means the person in whom beneficial title is vested.

Clean room - An uncontaminated area or room that is a part of the personal decontamination enclosure with provisions for storage of persons' street clothes and protective equipment.

Cleanup - The utilization of HEPA vacuuming to control and eliminate accumulations of asbestos material and asbestos waste material.

Clearance air monitoring - The employment of aggressive sampling techniques with a volume of air collected to determine the airborne concentration of residual fibers upon conclusion of an asbestos abatement project.

Commissioner - Commissioner of the New York State Department of Labor.

Contractor - A company, unincorporated association, firm, partnership or corporation and any owner or operator thereof, which engages in an asbestos project or employs persons engaged in an asbestos project.

Curtained doorway - A device that consists of at least three overlapping sheets of plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top and left side, the second sheet at the top and right side, and the third sheet at the top and the left side. All sheets shall have weights attached to the bottom to insure that the sheets hang straight and maintain a seal over the doorway when not in use.

Decontamination enclosure system - A series of connected rooms, separated from the work area and from each other by air locks, for the decontamination of persons, materials, equipment, and authorized visitors.

Encapsulant (sealant) or encapsulating agent - A liquid material that can be applied to asbestos material and which prevents the release of asbestos from the material by creating a membrane over the surface.

Enclosure - The construction of airtight walls, ceilings and floors between the asbestos material and the facility environment, or around surfaces coated with asbestos materials, or any other appropriate procedure that prevents the release of asbestos materials.

Equipment room - A contaminated area or room that is part of the personal decontamination enclosure system with provisions for the storage of contaminated clothing and equipment.

Fixed object - A unit of equipment, furniture or other fixture in the work area which cannot be readily removed from the work area.

Friable Asbestos Material - That condition of crumbled, pulverized, powdered, crushed or exposed asbestos capable of being released into the air by hand pressure.

Friable material containment - The encapsulation or enclosure of any friable asbestos material.

Glovebag technique - A method for removing asbestos material from heating, ventilating, and air conditioning (HVAC) ducts, piping runs, valves, joints, elbows, and other nonplanar surfaces in a noncontained work area. The glovebag assembly is a manufactured device consisting of a glovebag constructed of at least six mil transparent plastic, two inward-projecting longsleeve gloves, which may contain an inward projecting waterwand sleeve, an internal tool pouch, and an attached, labeled receptacle or portion for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and to contain all asbestos fibers released during the abatement process.

HEPA filter - A high efficiency particulate air filter capable of trapping and retaining 99.97 percent of particulate greater than 0.3 microns equivalent aerodynamic diameter.

HEPA vacuum equipment - Vacuuming equipment with a high efficiency particulate air filtration system.

Holding area - A chamber in the waste decontamination enclosure located between the washroom and an adjacent uncontaminated area.

Homogeneous work area - A site within the abatement work area that contains one type of asbestos material and where one type of abatement is used.

Large asbestos project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 160 square feet or more of asbestos or asbestos material or 260 linear feet or more of asbestos or asbestos material.

Minor asbestos project - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material.

Movable object - A unit of equipment, furniture or fixture in the work area that can be readily removed from the work area.

Negative air pressure equipment - A local exhaust system equipped with HEPA filtration. The system shall be capable of creating and maintaining a negative pressure differential between the outside and the inside of the work area.

Non-asbestos material - Any material containing one percent or less asbestos by weight.

Occupied area - Any frequented portion of the work site where abatement is not taking place.

Outside air - The air outside the building or structure.

Personal air monitoring - A method used to determine an individuals exposure to airborne contaminants. The sample is collected outside the respirator in the person's breathing zone.

Plasticize - To cover floors, walls, ceilings and other surfaces with 6 mil fire retardant plastic sheeting as herein specified.

Project - Any form of work performed in connection with the abatement of asbestos or alteration, renovation, modification or demolition of a building or structure that may disturb asbestos or asbestos material.

Removal - The stripping of any asbestos material.

Repair - Corrective action using required work practices to control fiber release from damaged areas.

Respiratory protection - Respiratory protection required of licensed asbestos workers and authorized visitors in accordance with the applicable laws.

Satisfactory clearance air monitoring results - For all post- abatement samples, airborne concentrations of total fibers that are less than 0.01 fibers per cubic centimeter or background levels, whichever are greater, using phase contrast microscopy (PCM).

Shower room - A room between the clean room and the equipment room in the personal decontamination enclosure with hot and cold running water controllable at the top and arranged for complete showering during decontamination.

Small asbestos project - An asbestos project involving the installation, removal, disturbances, enclosure, or encapsulation of more than 10 and less than 160 square feet of asbestos or asbestos material of more than 25 and less than 260 linear feet of asbestos or asbestos material.

Staging area - The area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the work area.

Surfactant - A chemical wetting agent added to water to improve its penetration.

Visible emissions - An emissions of particulate material that can be seen without the aid of instruments.

Washroom - A room between the work area and the holding area in the waste decontamination enclosure system, where equipment and waste containers are wet cleaned and/or HEPA vacuumed.

Waste decontamination enclosure system - An area, consisting of a washroom and a holding area, designated for the controlled transfer of materials and equipment.

Wet cleaning - The process of eliminating asbestos contamination from surfaces, equipment or other objects by using cloths, mops, or other cleaning tools.

Work area - Designated rooms, spaces, or areas where asbestos abatement takes place.

Work site - Premises where asbestos abatement is taking place.

Work Surface - Substrate surface from which asbestos-containing material has been removed.

1.07 UTILITIES, SERVICE AND TEMPORARY FACILITIES

A. The Owner shall make available to the Abatement Contractor all reasonable amounts of water and electrical power at no charge.

B. The Abatement Contractor shall provide, at his own expense, all electrical, water, and waste connections, extensions, and construction materials, supplies, etc. All connections must be approved in advance by the Owner and all work relative to the utilities must be in accordance with the applicable building codes.

C. The Abatement Contractor shall provide scaffolding, ladders and staging, etc. as necessary to accomplish the work of this contract. The type, erection and use of all scaffolding, ladders and staging, etc. shall comply with all applicable OSHA provisions.

D. All connections to the Owner's water system shall include reduced pressure backflow protection or double check and double gate valves. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.

E. The Abatement Contractor shall use only heavy duty abrasion resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water to each work area and to each decontamination unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment. All water must be shut off at the end of each shift.

F. The Abatement Contractor shall provide service to decontamination unit electrical subpanel with minimum 60 amp, 2 pole circuit breaker or fused disconnect and ground-fault circuit interrupters (GFCI), reset button and pilot light, connected to the building's main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work. This electrical subpanel shall be used for hot water heater, PAPR battery recharging and air sampling pumps.

G. The Abatement Contractor shall provide UL rated 40-gallon electric hot water heater to supply hot water for the decontamination unit shower. Activate from 30 amp circuit breaker on the electrical subpanel located within the decontamination unit. Provide with relief valve compatible with water heater operation; relief valve down to drip pan on floor with type L copper. Wiring of the hot water heater shall be in compliance with NEMA, NEC, and UL standards.

H. The Abatement Contractor shall provide identification warning signs at power outlets, which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 plugs into higher voltage outlets. Dry transformers shall be provided where required to provide voltages necessary for work operations. All outlets or power supplies shall be protected by ground fault circuit interrupter (GFCI) at the power source.

I. The Abatement Contractor shall use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas of work.

J. The Abatement Contractor shall provide general service incandescent lamps of wattage indicated or required for adequate illumination; Protect lamps with guard cages or tempered glass enclosures; Provide exterior fixtures where fixtures are exposed to moisture.

K. The Abatement Contractor shall provide temporary heat or air conditioning as necessary to maintain comfortable working temperatures inside and immediately outside the work areas. Heating and A/C equipment shall have been tested and labeled by UL, FM or another recognized trade association related to the fuel being used. Fuel burning heaters shall not be used inside containment areas. The Contractor shall also provide a comfortable working environment for occupied areas that are impacted by the asbestos removal.

L. The Abatement Contractor shall comply with recommendations of the NFPA standard in regard to the use and application of fire extinguishers. Locate fire extinguishers where they are most convenient and effective for their intended purpose, but provide not less than one extinguisher in each work area, equipment room, clean room and outside the work area.

1.08 REMOVAL OF FIXTURES

A. In locations where the Abatement Contractor is directed to dispose of fixtures he shall either decontaminate the fixtures and dispose of them as non-asbestos containing materials or he shall place them in an appropriate container and dispose of them as asbestos containing material.

B. In locations where the Abatement Contractor is directed to remove and reinstall fixtures, the fixtures shall be removed, decontaminated, labeled, protected with plastic and stored by the contractor in a location as directed by the Owner.

C. Upon completion of the asbestos removal and upon receiving satisfactory clearance air monitoring results, all items to be replaced shall be restored to their original location and reinstalled by the Abatement Contractor.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. GENERAL REQUIREMENTS

1. Materials shall be stored off the ground, away from wet or damp surfaces and under protective cover to prevent damage or contamination.

2. Damaged or deteriorating materials shall not be used and shall be removed from the premises.

3. Power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.

4. The Abatement Contractor shall make available to authorized visitors, ladders and/or scaffolds of sufficient dimension and quantity so that all work surfaces can be easily and safely reached for inspection. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos. Scaffolds and ladders shall comply with all applicable codes.

B. PLASTIC BARRIERS (POLYETHYLENE)

1. In sizes and shapes to minimize the number of joints.

   a. Six mil. (.006") fire-retardant for vertical protection (walls, entrances and openings).

   b. Six mil. (.006") fire-retardant for horizontal protection (fixed equipment) and heating grilles.

   c. Six mil. (.006") reinforced fire-retardant for floors of decon units.

2. Provide two (2) layers over all roof, wall and ceiling openings. Floor penetrations shall be sealed with a rigid material prior to plasticizing to prevent tripping and fall hazards. All seams within a layer shall be separated by a minimum distance of six feet and sealed airtight. All seams between layers shall be staggered.

3. Barrier Attachment - Commercially available duct tape (fabric or paper) and spray-on adhesive. Duct tape shall be capable of sealing joints of adjacent sheets of plastic, facilitating attachment of plastic sheets to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions.

C. SIGNS

1. Danger signs shall be provided and shall conform to the requirements of 29 CFR 1910.1101(k)(7) and shall comply with the requirements of ANSI Z535.2 2011 and shall be a minimum of 14" x 20". These signs shall bear the following information:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONEL ONLY

In addition, where the use of respirators and protective clothing is required in the regulated area the warning sign shall include the following as a minimum:

WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

D. DANGER LABELS & TAPE

1. Labels shall be affixed to any asbestos contaminated material in accordance with the requirements of 29 CFR 1910.1200 (f) of OSHA's Hazard Communication Standard, and shall contain at a minimum the following information:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

2. A label shall be affixed to each container of asbestos waste in accordance with the requirements of 49 CFR Parts 171 and 172, Hazardous Substances; Final Rule (U.S. Department of Transportation), and shall at a minimum contain the following information:

RQ ASBESTOS
SOLID, NOS, ORM-E, NA 9-NA 2212-PG III
(ASBESTOS)

E. SIGNS

2. Danger signs shall be provided and shall conform to the requirements of 29 CFR 1910.1101(k)(7) and shall comply with the requirements of ANSI Z535.2 2011 and shall be a minimum of 14" x 20". These signs shall bear the following information:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONEL ONLY

In addition, where the use of respirators and protective clothing is required in the regulated area the warning sign shall include the following as a minimum:

WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

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3. Labels shall be affixed to any asbestos contaminated material in accordance with the requirements of 29 CFR 1910.1200 (f) of OSHA's Hazard Communication Standard, and shall contain at a minimum the following information:

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CONTAINS ASBESTOS FIBERS
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CAUSES DAMAGE TO LUNGS
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AVOID CREATING DUST

4. A label shall be affixed to each container of asbestos waste in accordance with the requirements of 49 CFR Parts 171 and 172, Hazardous Substances; Final Rule (U.S. Department of Transportation), and shall at a minimum contain the following information:

RQ ASBESTOS
SOLID, NOS, ORM-E, NA 9-NA 2212-PG III
(ASBESTOS)

G. PROTECTIVE EQUIPMENT

1. Respiratory Requirements

   a. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators are the minimum allowable respiratory protection permitted to be utilized during removal operations.

   b. Where not in violation of NIOSH, OSHA, and any other regulatory requirements, the Abatement Contractor shall provide the following minimum respiratory protection to the maximum use concentrations indicated:

MSHA/NIOSH Approved Respiratory Protection	Maximum Use Concentration
Half-Mask Air Purifying with HEPA Filters	10x PEL
Full-Facepiece Air Purifying HEPA Filters and Quantitative Fit Test	10x PEL
Powered Air Purifying (PAPR), Loose fitting Helmet or Hood, HEPA Filter	25x PEL
Powered Air Purifying (PAPR), Full Facepiece, HEPA Filter	50x PEL
Supplied Air, Continuous Flow Loose fitting Helmet or Hood	25x PEL
Supplied Air, Continuous Flow Full Facepiece, HEPA Filter	50x PEL
Full Facepiece-Supplied Air Pressure Demand, HEPA Filter	100x PEL
Full Facepiece-Supplied Air Pressure Demand, with Aux. SCBA, Pressure Demand or Continuous Flow	>100x PEL

2. Disposable Clothing -"Tyvek" manufactured by Dupont or approved equal.

3. NIOSH approved safety goggles to protect eyes.

4. Polyethylene bags, 6 mil. (.006") thick (use double bags).

NOTE: Workers must wear disposable coveralls and respirator masks at all times while in the work area. Contaminated coveralls or equipment must be left in work area and not worn into other parts of the building.

H. TOOLS AND EQUIPMENT

1. Airless Sprayer - An airless sprayer, suitable for application of encapsulating material, shall be used.

2. Scaffolding - Scaffolding, as required to accomplish the specified work, shall meet all applicable safety regulations.

3. Transportation Equipment - Transportation equipment, as required, shall be suitable for loading, temporary storage, transport and unloading of contaminated waste without exposure to persons or property. Water tight, hard wall containers shall be provided to retain and dispose of any asbestos waste material with sharp-edged components that may tear plastic bags or sheeting. The containers shall be marked with danger labels.

4. Surfactant - Wetting Agents - "Asbestos-Wet" - Aquatrols Corp. of America or approved equal, and shall be non- carcinogenic.

5. Portable (negative air pressure) asbestos filtration system - by Micro-Trap, or approved equal.

6. Vacuum, HEPA type equal to "Nilfisk" #GA73, or "Pullman/Holt" #75 ASA.

7. Amended Water Sprayer - The water sprayer shall be an airless or other low-pressure sprayer for amended water application.

8. Other Tools and Equipment - The Abatement Contractor shall provide other suitable tools for the stripping, removal, encapsulation, and disposal activities including but not limited to: hand-held scrapers, nylon brushes, sponges, rounded edge shovels, brooms, and carts.

PART 3 – EXECUTION

3.01 PRE-ABATEMENT WORK AREA PREPARATION

A. The work area shall be vacated by the occupants prior to work area preparation and not reoccupied until satisfactory clearance air monitoring results have been achieved.

B. Caution signs shall be posted at all locations and approaches to a location where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted that permit a person to read the sign and take the necessary protective measures to avoid exposure.

C. Shut down and lock out electric power to all work areas. The Abatement Contractor shall provide temporary power and lighting and ensure safe installation of temporary power sources and equipment used where high humidity and/or water shall be sprayed in accordance with all applicable codes. All power to work areas shall be brought in from outside the area through a ground-fault interrupter at the source.

D. Isolate the work area HVAC system.

E. The personnel decontamination enclosure system shall be installed or constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material. The waste decontamination enclosure system shall be installed or constructed prior to commencement of abatement activities.

F. Movable objects within the work area shall be pre-cleaned using HEPA filtered vacuum equipment an/or wet cleaning and such objects shall be removed from the work area to an uncontaminated location. If disposed of as asbestos waste material, cleaning is not required.

G. Fixed objects and other items, which are to remain within the work area, shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Such objects shall be enclosed with two layers of at least six mil plastic sheeting and sealed with tape.

H. The work area shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall be prohibited. Asbestos material shall not be disturbed during pre-cleaning.

I. Isolation barriers that seal off all openings, including windows, corridors, doorways, ducts, and any other penetrations of the work area, shall be constructed using two layers of at least six mil fire-retardant plastic sheeting sealed with tape. Also, all seams in mechanical system components that pass through the work area shall be sealed. Doorways and corridors, which shall not be used for passage during work, shall also be sealed.

J. Removal of mounted objects. After isolation barriers are in place, objects such as light fixtures, electrical track, alarm systems, ventilation equipment and other items not previously sealed, shall be double sealed with six mil fire-retardant plastic sheeting. Localized HEPA filtered vacuum equipment shall be used during fixture removal to reduce asbestos dispersal.

K. Individual roof and floor drains shall be sealed watertight using two layers of 6-mil fire-retardant plastic sheeting and tape prior to plasticizing. Openings in floor shall be fully covered with plywood sheeting secured to the floor in such a way as to minimize a tripping hazard prior to plasticizing.

L. Emergency and fire exits from the work area shall be maintained or alternate exits shall be established according to all applicable codes.

M. Adequate toilet facilities shall be supplied by the Abatement Contractor and shall be located either in the clean area of the personnel decontamination enclosure or shall be readily accessible to the personnel decontamination enclosure.

3.02 LARGE ASBESTOS PROJECT PERSONNEL DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)

A. The personnel decontamination enclosure shall be constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material.

1. Construction and use of personnel decontamination enclosure systems shall be in accordance with ICR-56 and any Applicable or Site Specific Variances utilized on this project. Such systems may consist of existing rooms outside of the work area, if the layout is appropriate, that can be enclosed is plastic sheeting and are accessible from the work area. When this situation does not exist, enclosure systems may be constructed out of metal, wood or plastic support.

2. The personnel decontamination enclosure system shall consist of a clean room, a shower room, and an equipment room, in series, separated from each other and from the work area by three airlocks.

3. There shall be one shower per six full shift abatement persons calculated on the basis of the largest shift.

4. The personnel decontamination enclosure system shall be fully framed, sheathed for safety and constructed to prevent unauthorized entry.

5. Personnel decontamination enclosure systems constructed at the work site shall utilize at least six mil fire-retardant opaque plastic sheeting. At least two layers of six mil fire-retardant reinforced plastic sheeting shall be used for the flooring of this area.

6. All prefabricated decontamination units shall be completely decontaminated and sealed prior to separation and removal from the work area. Mobile decontamination units shall remain in place until satisfactory clearance results have been attained.

7. The clean room shall be sized to accommodate all authorized persons. Benches, lockers and hooks shall be provided for street clothes. Shelves for storing respirators shall also be provided. Clean clothing, replacement filters for respirators, towels and other necessary items shall be provided. The clean room shall not be used for the storage of tools, equipment or materials. It shall not be used for office space. A lockable door shall be provided to permit access to the clean room from outside the work area or enclosure. It shall be used to secure the work area and decontamination enclosure during off-shift hours.

8. The shower room shall contain one or more showers. Each shower head shall be supplied with hot and cold water adjustable at the tap. The shower enclosure shall be constructed to ensure against leakage of any kind. Uncontaminated soap, shampoo and towels shall be available at all times. Shower water shall be drained, collected and filtered through a system with at least 5.0 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste. The shower room shall be constructed in such way that travel through the decontamination unit shall be through the shower.

9. The equipment room shall be used for the storage of equipment and tools after decontamination using a HEPA filtered vacuum and/or wet cleaning. A one day supply of replacement filters, in sealed containers, for HEPA vacuums and negative pressure ventilation equipment, extra tools, containers of surfactant and other materials and equipment that may be required during the abatement project may also be stored here. A walk-off pan filled with water shall be located in the work area just outside the equipment room for persons to clean foot covering when leaving the work area. A drum lined with a labeled, at least six mil plastic bag is required for collection of clothing and shall be located in this room. Contaminated footwear and work clothes shall be stored in this area.

3.03 WASTE DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)

A. General Requirements

1. A waste decontamination enclosure system shall consist of the following:

   a. A washroom/cleanup room shall be constructed with an airlock doorway to the work area and another airlock doorway to the holding area.

   b. The holding area shall be constructed with an airlock doorway to the washroom/cleanup room and another lockable door to the outside.

2. Where there is only one egress from the work area, the holding area of the waste decontamination enclosure system may branch off from the equipment decontamination room, which doubles as a waste washroom, of the personnel decontamination enclosure.

3. The waste washroom shall be equipped with a drain installed to collect water and deliver it to the shower drain where it shall be filtered through a system with at least 5.0 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.

4. The waste washroom shall be constructed in such a way that travel through the rooms shall be through the waste washroom

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved:

1. All persons shall enter and exit the work area through the personnel decontamination enclosure system.

2. All persons who enter the work area or an enclosure shall sign the entry/exit log, located in the clean room, upon every entry and exit.

3. All persons, before entering the work area, or an enclosure shall read and be familiar with all posted regulations, personal protection requirements, including work area entry and exit procedures, and emergency procedures. The entry/exit log headings shall indicate, and the signatures shall be used to acknowledge, that these have been reviewed and understood by all persons prior to entry.

4. All persons shall proceed first to the clean room, remove all street clothing, store these items in clean sealable plastic bags or lockers and don coveralls, head covering, foot covering and gloves. All persons shall also don NIOSH approved respiratory protection. Clean respirators and protective clothing shall be utilized, by each person, for each separate entry into the work area. Respirators shall be inspected prior to each use and tested for proper seal using quantitative or qualitative fit checks.

5. Persons wearing designated personal protective equipment shall proceed from the clean room through the shower room to the equipment room, where necessary tools are collected and any additional clothing shall be donned, before entry into the work area.

6. Before leaving the work area, all persons shall remove gross contamination from the outside of respirators and protective clothing by brushing, wet cleaning, and/or HEPA vacuuming.

7. Persons shall proceed to the equipment room where all coveralls, head covering, foot covering and gloves shall be removed. Disposable clothing shall be deposited into labeled containers for disposal. Reusable contaminated clothing, footwear, head gear and gloves shall be stored in the equipment room when not being used in the work area.

8. Still wearing respirators, persons shall proceed to the shower area, clean the outside of the respirator and the exposed face area under running water prior to removal of the respirator, and then fully and vigorously shower and shampoo to remove residual asbestos contamination. Respirators shall be washed thoroughly with soap and water. Some types of respirators will require slight modification of these procedures. An airline respirator with HEPA filtered disconnect protection shall be disconnected in the equipment room and worn into the shower. A powered air-purifying respirator facepiece shall be disconnected from the filter/power pack assembly prior to entering the shower.

9. After showering and drying, all persons shall proceed to the clean room and don clean personal protective equipment if returning to the work area or street clothing if exiting the enclosure.

3.05 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION & REMOVAL PROCEDURES

A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved.

1. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the work area before moving such items into the waste decontamination enclosure system airlock by persons assigned to this duty. These work area persons shall not enter the airlock.

2. These contaminated items shall be removed from the airlock by persons stationed in the washroom during waste removal operations. These washroom persons shall remove gross contamination from the exterior of their respirators and protective clothing by brushing, HEPA vacuuming and/or wet cleaning.

3. Once in the waste decontamination enclosure system, external surfaces of contaminated containers and equipment shall be cleaned a second time by wet cleaning.

4. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting and sealed airtight.

5. The clean recontainerized items shall be moved into the airlock that leads to the holding area. The washroom persons shall not enter this airlock or the work area until waste removal is finished for that period.

6. Containers and equipment shall be moved from the airlock and into the holding area by persons dressed in clean personal protective equipment, who have entered from uncontaminated areas.

7. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.

8. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.

9. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.

10. Containers labeled with Asbestos hazard warnings shall not be used to dispose of non asbestos waste.

3.06 ENGINEERING CONTROLS

A. Ventilation.

1. The Abatement Contractor shall employ HEPA equipped vacuums or negative air pressure equipment for ventilation as required.

2. All negative air pressure equipment ventilation units shall be equipped with HEPA filtration. The Contractor shall provide a manufacturer's test certificate for each unit documenting the capability of trapping and retaining 99.97 percent of asbestos fibers greater than 0.3 microns equivalent aerodynamic diameter.

3. A power supply shall be available to satisfy the requirements of the total of all ventilating units.

4. On electric power failure, abatement shall stop immediately and shall not resume until power is restored and exhaust units are operating fully. On extended power failure, longer than one hour, the decontamination facilities, after the evacuation of all persons from the work area, shall be sealed airtight.

5. If extending the exhaust of the ventilation units 50 feet from the building would result in an exhaust location either in the road, blocking driveway access to the facility or within 50 feet of other buildings, a second unit will be run in series with the primary unit.

3.07 MAINTENANCE OF DECONTAMINATION ENCLOSURE SYSTEMS AND WORK AREA BARRIERS

A. GENERAL REQUIREMENTS

1. The Consultant must review and approve installation before commencement of work. Upon completion of the construction of all plastic barriers and decontamination system enclosures and prior to beginning actual abatement activities.

2. All plastic barriers inside the work area, in the personnel decontamination enclosure system, in the waste decontamination enclosure system and at partitions constructed to isolate the work area from occupied areas, shall be inspected by the asbestos supervisor at least twice daily. The barriers shall be inspected before the start of and following the completion of the day's abatement activities. Inspections and observations shall be documented in the project log.

3. Damage and defects in the barriers and/or enclosure systems shall be repaired immediately upon discovery and prior to resumption of abatement activities.

4. At any time during the abatement activities, if visible emissions are observed outside of the work area of if damage occurs to the barriers, work shall be stopped, repairs made and visible residue immediately cleaned up using HEPA vacuuming methods prior to the resumption of abatement activities.

5. The Abatement Contractor shall HEPA vacuum and/or wet clean the waste decontamination enclosure system and the personnel decontamination enclosure system at the end of each day of abatement activities.

3.08 HANDLING AND REMOVAL PROCEDURES

The Abatement Contractor may utilize existing provisions of ICR-56, Applicable Variances or a Site Specific Variance, approved by the Owner's Consultant, to permit the conduct of this work.

3.09 ABATEMENT PROCEDURES

A. AIR SAMPLING - By Owner

1. Air sampling and analysis shall be conducted according to the requirements of Subpart 56-4 before the start, during and after the completion of the asbestos removal project.

2. In addition to the requirements of Subpart 56-4, air monitoring shall be conducted in accordance with any approved job specific variance(s) or applicable variance utilized.

3. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.

4. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR 763.90[i].

B. The provisions of the Applicable Variances or a Job Specific Variance shall apply only in those areas where approval has been granted by the NYS DOL and the Contractor has obtained concurrence from the Owner's Consultant. All other applicable provisions of Industrial Code Rule 56-1 through 56-12 shall be complied.

C. A copy of the NYS DOL Job Specific or Applicable Variance, if applicable, shall be conspicuously posted at the work area(s).

D. The Abatement Contractor shall construct a decontamination unit at the work site. The Abatement Contractor shall, as a minimum, comply with the requirements of 29 CFR 1926.1101(j); Hygiene facilities and practices for employees.

3.10 ENCAPSULATION PROCEDURES

The following procedures shall be followed to seal in non-visible residue, after obtaining satisfactory clearance air monitoring results, while conducting lockdown encapsulation on any surfaces which were the subject of removal or other remediation activities:

A. Only encapsulants rated as acceptable or marginally acceptable on the basis of Battelle Columbus Laboratory test procedures and rating requirements developed under the 1978 USEPA contract shall be used for lockdown encapsulation.

B. Sealants considered for use in encapsulation shall first be tested to ensure that the sealant is adequate for its intended use. A section of the work surface shall be evaluated following this initial test application of the sealant to quantitatively determine the sealant's effectiveness in terms of penetrating and locking down the asbestos fibers. The American Society of Testing and Materials (ASTM) Committee E06.21.06E on Encapsulation of Building Materials has developed a guidance document to assist in the selection of an encapsulant.

C. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon.

D. Encapsulants shall be applied using airless spray equipment.

1. Spraying is to occur at the lowest pressure range possible to minimize fiber release from encapsulant impact at the surface. It shall be applied with a consistent horizontal or vertical motion.

E. Encapsulation shall be utilized as a surface sealant once all asbestos containing materials have been removed in a work area. In no event shall encapsulant be applied to any surface that was the subject of removal or other remediation activities prior to obtaining satisfactory clearance air monitoring.

3.11 CLEANUP PROCEDURES

A. The following cleanup procedures shall be required.

1. Cleanup of accumulations of loose asbestos material shall be performed whenever enough loose asbestos materials have been removed to fill a single leak tight container of the type commensurate with the material properties. In no case shall cleanup be performed less than once prior to the close of each working day. Asbestos material shall be kept wet until cleaned up.

2. Accumulations of dust shall be cleaned off all surfaces on a daily basis using HEPA vacuum cleaning methods.

3. Decontamination enclosures shall be HEPA vacuumed at the end of each shift.

4. Accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pans, squeegees or shovels. Metal shovels shall not be used to pick up or move waste.

5. Excessive water accumulation or flooding in the area shall require work to stop until the water is collected and disposed of properly.

B. The following cleanup procedures shall be required after completion of all removal activities.

1. All accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pan, squeegees or shovels. Metal shovels shall not be used to pick up or move waste. HEPA vacuums shall be used to clean all surfaces after gross cleanup.

2. Cleaning. All surfaces in the work area shall be HEPA vacuumed. To pick up excess liquid and wet debris, a wet purpose shop vacuum may be used and shall be decontaminated prior to removal from the work area.

3. Windows, doors, HVAC system vents and all other openings shall remain sealed. Decontamination enclosure systems shall remain in place and be utilized.

4. All containerized waste shall be removed from the work area and the holding area.

5. All tools and equipment shall be decontaminated and removed from the work area.

6. A final visual inspection and clearance air monitoring, as per the schedule for air sampling and analysis, shall be conducted.

7. The isolation barriers and decontamination unit shall be removed only after satisfactory clearance air monitoring results have been achieved.

3.12 SAFETY MONITORING – CONSULTANT:

The Consultant will designate an Asbestos Safety Technician (AST) to represent the Owner during the removal program. The AST must be on the job site at all times during abatement work. Absolutely no abatement or preparation work will occur without the presence of the AST.

The AST will conduct four (4) milestone inspections.

1. Pre-commencement inspection shall be conducted as follows:

   a. Notification in writing to the Consultant shall be made by the Abatement Contractor to request a pre-commencement inspection at least 48 hours in advance of the desired date of inspection. This inspection shall be requested prior to beginning preparatory work in another work area.

   b. The AST shall ensure that:

      i. The job site is properly prepared and that all containment measures are in place;

      ii. The designated supervisor shall present to the inspector a valid supervisor's license issued by the New York Department of Labor;

      iii. All workers shall present to the inspector a valid handler's license issued by the New York Department of Labor;

      iv. Measures for the disposal of removed asbestos material are in place and shall conform to the adopted standards;

      v. The Abatement Contractor has a list of emergency telephone numbers at the job site which shall include the monitoring firm employed by the Owner and telephone numbers for fire, police, emergency squad, local hospital and health officer.

   c. If all is in order, the AST shall issue a written notice to proceed in the field. If the job site is not in order, then any needed corrective action must be taken before any work is to commence. Conditional approvals shall not be granted.

Progress inspection shall be conducted as follows:

   a. Primary responsibility for ensuring that the abatement work progresses in accordance with these technical specifications and regulatory requirements rests with the Abatement Contractor. The AST shall continuously be present to observe the progress of work and perform required tests.

   b. If the AST observes irregularities at any time, he shall direct such corrective action as may be necessary. If the Abatement Contractor fails to take the corrective action required, or if the Abatement Contractor or any of their employees habitually and/or excessively violate the requirements of any regulation, then the AST shall inform the Owner who shall issue a Stop Work Order to the Abatement Contractor and have the work site secured until all violations are abated.

Clean-up inspections shall be conducted as follows:

a. Notice for clean-up inspection shall be requested by the Abatement Contractor at least 24 hours in advance of the desired date of inspection;

b. The clean-up inspection shall be conducted prior to the removal of any isolation or critical barriers and before final air clearance monitoring;

c. The AST shall ensure that:

i. The work site has been properly cleaned and is free of visible asbestos containing material and debris.

ii. All removed asbestos has been properly placed in a locked secure container outside of the work area.

d. If all is in order, the AST shall issue a written notice of authorization to remove surface barriers from the work area. All isolation barriers shall remain in place until satisfactory clearance air sampling has been completed.

4. Clearance Visual Inspection shall be conducted after the removal of non-critical plastic sheeting. The AST shall insure that:

a. The work area is free of all visible asbestos or suspect asbestos debris and residue.

b. All waste has been properly bagged and removed from the work area.

c. Should clearance visual inspection identify residual debris, as determined by the AST, the Abatement Contractor is responsible for recleaning the area at his own cost and shall bear all costs of reinspection until acceptable levels are achieved.

B. The Abatement Contractor shall be required to receive written approval before proceeding after each milestone inspection.

3.13 PERSONNEL AIR MONITORING – CONTRACTOR (29 CFR 1926.1101)

A. Personnel air monitoring shall be provided to determine both short-term (STEL) and full shift during when abatement activities occur. Personnel sampling shall be performed in each work area in order to accurately determine the concentrations of airborne asbestos to which workers may be exposed.

B. The Abatement Contractor shall have a qualified "Competent Person" (as specified in 29 CFR 1926 OSHA) to conduct personnel air monitoring.

C. The laboratory performing the air sample analysis shall be certified by NYS DOH ELAP and approved by the consultant.

D. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.

3.14 CLEARANCE AIR MONITORING

A. Air samples will be collected in and around the work areas at the completion of abatement activities.

B. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.

C. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR part 763 “Asbestos-Containing Materials in Schools; Final Rule and Notice” section 763.90.

D. ***RETESTING***

Should clearance air monitoring yield fiber concentrations above the “Clearance” criteria of either 0.01 fibers per CC and/or background levels (PCM) –OR- seventy (70) structures per square millimeter (TEM/AHERA), the Abatement Contractor is responsible for re-cleaning the area at his own cost and shall bear all costs associated with the retesting of the work area(s) including monitoring labor, sampling, analysis, etc. until such levels are achieved.

3.15 RESPIRATORY PROTECTION REQUIREMENT

A. Respiratory protection shall be worn by all individuals inside the work area from the initiation of the asbestos project until all areas have successfully passed clearance air monitoring in accordance with these specifications. The Abatement Contractor shall keep available at all times two PAPR's with new filters and charged batteries for use by authorized visitors.

B. All respiratory protection shall be MSHA/NIOSH approved in accordance with the provisions of 30 CFR Part II. All respiratory protection shall be provided by the Abatement Contractor, and used by workers in conjunction with the written respiratory protection program.

C. The Abatement Contractor shall provide respirators that meet the requirements of 29 CFR Parts 1910 and 1926.

1. Full facepiece Type C supplied-air respirators operated in pressure demand mode equipped with an auxiliary self- contained breathing apparatus, operated in pressure demand or continuous flow, shall be worn during gross removal, demolition, renovation and/or other disturbance of ACM whenever airborne fiber concentrations inside the work area are greater than 10.0 f/cc.

2. Full facepiece Type C supplied-air respirators operated in pressure demand mode with HEPA filter disconnect protection shall be work during gross removal, demolition, renovation and/or other disturbance of ACM with an amphibole content and/or whenever airborne fiber concentrations inside the work area are equal to or greater than 0.5 f/cc and less than or equal to 10.0 f/cc.

3. Full facepiece powered air-purifying respirators (PAPR) equipped with HEPA filters shall be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.5 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow, with HEPA filter disconnect protection, may be substituted for a powered air-purifying respirator.

4. Loose fitting helmets or hoods with powered air-purifying respirators (PAPR) equipped with HEPA filters may be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.25 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow may be substituted for a powered air- purifying respirator.

5. Half-mask or full-face air-purifying respirators with HEPA filters shall be worn only during the preparation of the work area and final clean up procedures provided airborne fiber concentrations inside the work area are less than 0.1 f/cc.

6. Use of single use dust respirators is prohibited for the above respiratory protection.

D. Workers shall be provided with personally issued and individually marked respirators. Respirators shall not be marked with any equipment that will alter the fit of the respirator in any way. Only waterproof identification markers shall be used.

E. The Abatement Contractor shall ensure that the workers are qualitatively or quantitatively fit tested by an Industrial Hygienist initially and every six months thereafter with the type of respirator he/she will be using.

F. Whenever the respirator design permits, workers shall perform the positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow as specified by the manufacturer.

G. No facial hair, which interferes with the face-to-mask sealing surface, shall be permitted to be worn when wearing respiratory protection that requires a mask-to-face seal.

H. Contact lenses shall not be worn in conjunction with respiratory protection.

I. If a worker wears glasses, a spectacle kit to fit their respirator shall be provided by the Abatement Contractor at the Abatement Contractor's expense.

J. Respiratory protection maintenance and decontamination procedures shall meet the following requirement:

1. Respiratory protection shall be inspected and decontaminated on a daily basis in accordance with OSHA 29 CFR 1910.134(b); and

2. HEPA filters for negative pressure respirators shall be changed after each shower; and

3. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures; and

4. Airline respirators with HEPA filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator facepieces shall be worn into the shower. Filtered/power pack assemblies shall be decontaminated in accordance with manufacturers' recommendations; and

5. Respirators shall be stored in a dry place and in such a manner that the facepiece and exhalation valves are not distorted; and

6. Organic solvents shall not be used for washing of respirators.

K. No visitors shall be allowed to enter the contaminated area if they do not have their medical certification and training certificate. Authorized visitors shall be provided with suitable PAPR respirators and instructions on the proper use of respirators whenever entering the work area.

3.16 DISPOSAL OF WASTE

A. APPLICABLE REGULATIONS

1. All asbestos waste shall be stored, transported and disposed of as per, but not limited to, the following Regulations:

   a. NYS Code Rule 56

   b. U.S. Department of Transportation (DOT)
   Hazardous Substances
   Title 29, Part 171 and 172 of the code of Federal Regulations
   regarding waste collector registration

   c. Regulations regarding waste collector registration Title 6, part 364 of the New York State Official Compilation of Codes, Rules and Regulations – 6 NYCRR 364

   d. USEPA NESHAPS 40 CRF 61

   e. USEPA ASBESTOS WASTE MANAGEMENT GUIDANCE EPA/530-SW-85-007

B. TRANSPORTER OR HAULER - The Abatement Contractor shall bear full responsibility for proper characterization, transportation and disposal of all solid or liquid waste, generated during the project, in a legal manner. The Owner shall approve all transportation and disposal methods.

1. The Abatement Contractor's Transporter (hauler) and disposal site shall be approved by the Owner. The Abatement Contractor shall remove within 48 hours all asbestos waste from the site after completing the clean up.

2. The Transporter must possess and present to the Owner's representative a valid New York State Department of Environmental Conservation Part 364 asbestos hauler's permit to verify license plate and permit numbers. The Owner's representative will verify the authenticity of the hauler's permit with the proper authority.

3. The Abatement Contractor shall give 24 hour notification prior to removing any waste from the site. All waste shall be removed from site only during normal working hours. No waste may be taken from the site without authorization from the Owner's representative.

4. The Abatement Contractor shall have the Transporter give the date and time of arrival at the disposal site.

5. The Transporter with the Abatement Contractor and Owner's consultant shall inspect all material in the transport container prior to taking possession and signing the Waste Manifest. The Transporter shall not have any off site transfers or be combined with any other off-site asbestos material.

6. The Transporter must travel directly to the disposal site with no unauthorized stops.

C. WASTE STORAGE CONTAINER

1. During loading and on site storage, the asbestos waste container shall be labeled with EPA Danger signage:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

2. The NYS DEC Hauler's Permit number shall be on both sides and back of the container.

3. The Container will not be permitted to leave the site without the proper signage.

4. A copy of the completed waste manifest shall be forwarded directly to the Owner's Consultant by the disposal facility.

5. Packaging of Non-friable Asbestos. Use of an open top container shall require written request, by the Contractor, and written approval by the Owners Representative, and be performed in compliance with all applicable regulations.

   a) A chute, if used, shall be air/dust tight along its lateral perimeter and at the terminal connection to the dumpster at ground level (solid wall and top container). The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used.

   b) The container shall be lined with a minimum of two (2) layers of 6 mil. Fire-retardant polyethylene draped loosely over the sides so as to facilitate being wrapped over the top of the load and sealed prior to transport from the site.

   c) Prior to transport from the work site the Dumpster will be disconnected from the chute and sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.

6. Packaging Friable Asbestos.

   a) The container shall be a solid wall, hard top and lockable container.

   b) The container shall be locked upon arrival at the site to restrict access. Security shall be provided at the entrance to the container during the loading process and immediately locked upon completion.

   c) The interior walls, floor and ceiling shall be lined with two (2) layers of 6 mil. Fire-retardant polyethylene.

   d) The waste shall be loaded in such a manner as to protect the integrity of the individual waste packages.

   e) Prior to transport from the work site the interior of the Dumpster will sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.

D. WASTE DISPOSAL MANIFEST

1. The Asbestos Waste Manifest shall be equivalent to the “Waste Shipment Record” included in 40 CFR 61. A copy of the Contractor’s manifest shall be reviewed by the Owner’s Consultant and shall be the only manifest used.

2. The Manifest shall be verified by the Owner’s Consultant indicating that all the information and amounts are accurate and the proper signatures are in place.

3. The Manifest shall have the signatures of the Abatement Contractor and the Transporter prior to any waste being removed from the site.

4. The Manifest shall be signed by the Disposal Facility owner or operator to certify receipt of asbestos containing materials covered by the manifest.

5. A copy of the completed manifest shall be provided by the Abatement Contractor to the Owner’s Consultant and remain on site for inspection.

6. Abatement Contractor shall maintain a waste disposal log which indicates load number, date and time left site, container size, type of waste, quantity of waste, name of hauler, NYS DES permit number, trailer and tractor license number, and date manifest was returned to Consultant.

7. The Disposal Facility owner or operator shall return a signed copy of the Waste Manifest directly to:

SUNY Purchase Association

735 Anderson Hill Road

Purchase, New York 10577

ATTN: Patrick Savolskis

8. Copies of the completed Waste Manifest are to be sent by the disposal facility to the Hauler and Abatement Contractor.

9. Submit signed dump tickets and manifests with final payment request.

10. Final payment request will not be honored without signed dump ticket or manifests accounting for all asbestos waste removed from the site.

E. VIOLATIONS OF SPECIFICATIONS

1. Violations of the safety, hygiene, environmental, procedures herein, any applicable federal, state of local requirement s or failure to cooperate with the Owner's representative shall be grounds for dismissal and/or termination of this contract.

F. VIOLATIONS OF NO SMOKING POLICY

1. The Federal Pro Children Act of 1994 prohibits School District Officials from smoking in any buildings or on the grounds that is property of the School District. The District shall be considered smoke free. The School District strongly enforces its' No Smoking Policy. It is the Contractor's responsibility to inform all workers of this policy. Any worker(s) involved with this project that are found smoking or using tobacco products will be informed that they are in violation of the Federal and State Law and School Board Policy and will be removed from site.

3.17 LOCATION OF WORK – BASE BID

(Please see attached Drawings for approximate locations)

1) SUNY PURCHASE ASSOCIATION – Café Addition and Renovation (1st FLOOR) (Spring 2018)

Asbestos Abatement Contractor responsible for total and complete removal and disposal of approximately 3,800 SF of friable Sheetrock Walls with asbestos-containing Joint/Taping Compounds in three separate large containments, in three location on the first floor, as detailed on attached ACM Location Drawings (#ASB-101). Asbestos Abatement Contractor to perform removals utilizing manual, wet-methods to ensure total and complete removal of all contaminated materials including any and all insulation within the wall cavities, Asbestos Abatement Contractor responsible for performing all removals activities required to access materials, as well as for providing all labor, equipment and materials necessary.

2) SUNY PURCHASE ASSOCIATION – Café Addition and Renovation (BASEMENT) (Spring 2018)

Asbestos Abatement Contractor responsible for total and complete removal and disposal of approximately 300 SF of friable Sheetrock Soffit with asbestos-containing Joint/Taping Compounds. As detailed on attached ACM Location Drawing (#ASB-100). Asbestos Abatement Contractor responsible for total and complete removal and disposal of approximately 350 SF of friable Sheetrock Walls with asbestos-containing Joint/Taping Compounds. As detailed on attached ACM Location Drawing (#ASB-100). Asbestos Abatement Contractor responsible for total and complete removal and disposal of approximately 150 SF of friable Sheetrock Walls/Ceiling with asbestos-containing Joint/Taping Compounds. As detailed on attached ACM Location Drawing (#ASB-100). Asbestos Abatement Contractor responsible for total and complete removal and disposal of approximately 20 SF of non-friable Glue Dabs on Sheetrock/CMU Walls. As detailed on attached ACM Location Drawing (#ASB-100) Asbestos Abatement Contractor to perform removals utilizing manual, wet-methods to ensure total and complete removal of all contaminated materials including any and all insulation with in the wall cavities, Asbestos Abatement Contractor responsible for performing all unit cover removals activities required to access materials, as well as for providing all labor, equipment and materials necessary.

3) SUNY PURCHASE ASSOCIATION – Café Addition and Renovation (Exterior) (Summer 2018)

Asbestos Abatement Contractor responsible for the complete removal and disposal of approximately 200 SF of non-friable asbestos-containing waterproofing tar. As detailed on attached ACM Location Drawing (#ASB-100). GC will be response to excavate all areas leaving the last two feet closest to the existing foundation wall for the Asbestos Abatement contractor to remove manually. GC will be response for all shoring of materials and to render the excavated area safe to enter. Asbestos Abatement Contractor to perform removals utilizing manual, wet-methods to ensure total and complete removal of all contaminated materials including any and all insulation with in the wall cavities, Asbestos Abatement Contractor responsible for performing all removals activities required to access materials, as well as for providing all labor, equipment and materials necessary.

4) SUNY PURCHASE ASSOCIATION – Café Addition and Renovation (Exterior)(Summer 2018)

General Note: Removal and/or Abatement of existing roofing materials are excluded from this project and will be coordinated with The Campus Roof Replacement Project.

END OF LOCATION OF WORK

3.18 GENERAL

A. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to: ceiling tiles, ceiling finishes, wall finishes, floor finishes, etc.

B. The Abatement Contractor shall be responsible for all demolition required to access materials identified in scope of work and on associated drawings.

C. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. Additional asbestos abatement performed prior to the order to proceed will not be acknowledged.

D. The Abatement Contractor shall remove asbestos-containing floor covering to the building substrate beneath; in areas indicted. Subsequent to final air clearance the substrate shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.

E. Power tools used to drill, cut into or otherwise disturb asbestos containing material shall be equipped with HEPA filtered local exhaust ventilation.

F. The Abatement Contractor shall provide access to GFCI electrical power, required to perform the area air monitoring for this project, within and immediately adjacent to each work area.

G. Unwrapped or unbagged ACM shall be immediately placed in an impermeable waste bag or wrapped in plastic sheeting.

H. Coordinate all removal operations with the Owner.

RETURN THIS EXECUTED FORM WITH COMPLETED BID SHEET

Asbestos Employee Medical Examination Statement
Certificate of Worker Release
Asbestos Employee Training Statement
CERTIFICATE OF WORKERS'S ACKNOWLEDGEMENT

PROJECT NAME: ***SUNY PURCHASE ASSOCIATION – Café Addition and Renovation***

ABATEMENT CONTRACTOR'S NAME:_____

WORKING WITH ASBESTOS INVOLVES POTENTIAL EXPOSURE TO AIRBORNE ASBESTOS FIBERS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER AND RESPIRATORY DISEASES. SMOKING CIGARETTES AND INHALATION OF ASBESTOS FIBERS INCREASES THE RISK THAT YOU WILL DEVELOP LUNG CANCER ABOVE THAT OF THE NON-SMOKING PUBLIC.

The Contract for this project requires the Abatement Contracting Company to: 1) supply proper respiratory protection devices, and training on their use, to their employees; 2) provide training on safe work practices, and on use of the equipment used on the project, to their employees; and, 3) provide annual medical examinations to their employees meeting the requirements of 29 CFR 1926.1101. The Abatement Contracting Company's signature on this certificate, documents that these contractual obligations are fulfilled, and that you understand the information presented to you.

**************DO NOT SIGN THIS FORM UNLESS YOU FULLY UNDERSTAND THIS INFORMATION**************

RESPIRATORY PROTECTION: I have been trained in the proper use and limitations of the type of respiratory protection devices to be used on this project. I have reviewed the written respiratory protection program manual and a copy is available for my use. Respiratory protection equipment has been proved, by the Contractor, at no cost to me.

TRAINING COURSE: I have been trained in the risks and dangers associated with handling asbestos, breathing asbestos dust, proper work procedures, personal protection and engineering controls. I have satisfactorily completed and Asbestos Safety Training Program for New York State and have been issued a New York State Department of Health Certificate of Asbestos Safety Training.

MEDICAL EXAMINATION: I have satisfactorily completed a medical examination within the last 12 months that meets the OSHA requirement for an asbestos worker and included at least 1) medical history 2) pulmonary function 3) medical examination 4) approval to wear respiratory protection devises and may have included an evaluation of a chest x-ray.

Signature:_____ Printed Name: _____ Date:_____

Witness Signature:_____ Printed Name: _____ Date:_____

RETURN THIS EXECUTED FORM WITH COMPLETED BID SHEET

RETURN THIS EXECUTED FORM WITH COMPLETED BID SHEET

ESTIMATE OF ACM QUANTITIES

PROJECT NAME: ***SUNY PURCHASE ASSOCIATION – Café Addition and Renovation***

****

EACH ABATEMENT CONTRACTOR SHALL READ AND ACKNOWLEDGE THE FOLLOWING NOTICE. A SIGNED AND DATED COPY OF THIS ACKNOWLEDGMENT SHALL BE SUBMITTED WITH THE ABATEMENT CONTRACTOR'S BID FOR THIS PROJECT. FAILURE TO DO SO MAY, AT THE SOLE DISCRETION OF THE OWNER, RESULT IN THE BID BEING CONSIDERED NON-RESPONSIVE AND RESULT IN DISQUALIFICATION OF THE ABATEMENT CONTRACTOR'S BID ON THIS PROJECT.

****

***** NOTICE *****

The linear and square footages listed within this specification are approximates. Abatement Contractor is required to visit the work locations prior to bid submittal in order to take actual field measurements within each listed location. The Abatement Contractor shall base their bid on actual quantities determined, by them, at the site walkthrough. Estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project.

****

Acknowledgment: I have read and understand the above **NOTICE** regarding removal quantity estimates and understand that estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project. The Abatement Contractor's signatory represents to the Owner that he/she has the authority of the entity he/she represents to sign this agreement on its behalf.

Company Name: _____
Type or Print

BY: _____ _____ _____
Signature Title Date

Print Name: _____

RETURN THIS EXECUTED FORM WITH COMPLETED BID SHEET

ASSOCIATED ASBESTOS REMOVAL LOCATION DRAWINGS

- ***SUNY PURCHASE ASSOCIATION – Café Addition and Renovation:***

  DRAWING #ASB100 – Basement Floor Plan –
  DRAWING #ASB101 – 1st Floor Plan –

END OF SPECIFICATION
SECTION 02080

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Demolition and removal of portions of exterior masonry walls as indicated.
2. Demolition and removal of storefront, as indicated.
3. Demolition and removal of portions of concrete slabs, as indicated.
4. Demolition and removal of stair handrail, as indicated.
5. Demolition and removal of interior partitions, and/or portions of interior partitions, as indicated.
6. Demolition and removal of finish systems, including ceilings and floor finishes as indicated.
7. Demolition and removal of doors, frames and hardware, as indicated.
8. Demolition and removal of mechanical, electrical and plumbing systems, as indicated.
9. Removal and salvage of the following to be returned to Owner:

    a. Loose furniture, fixtures and equipment.

B. Related Sections include the following:

1. Division 01 Section "Summary" for use of premises and Owner-occupancy requirements.
2. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
3. Division 01 Section "Cutting and Patching" for cutting and patching procedures.
4. Division 02 Abatement Sections.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property.

1. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 PRE-DEMOLITION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property **for environmental protection, for dust control**, and **for noise control**. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of proposed dust- and noise-control temporary partitions and means of egress.
5. Coordination of Owner's continuing occupancy of portions of existing building.
6. Means of protection for items to remain and items in path of waste removal from building.

C. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

1. Comply with requirements specified in Division 01 Section "Summary."

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in construction to be selectively demolished. A report on the presence of hazardous materials is included in Division 00 Section “Existing Hazardous Materials Information.” Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified in other Division 02 Sections.
2. If unidentified hazardous materials are encountered during the work, do not disturb hazardous materials or items suspected of containing hazardous materials. Stop all work on the project and immediately notify Architect and Owner.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

1. Membrane roofing system.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
6. Comply with indoor air quality requirements specified in Division 01 Section “Indoor Air Quality Construction Plan.”

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property.

1. Include cost of all transportation and disposal.
2. Provide verification of all disposal trips.
3. Hazardous materials are to be handled and disposed of in accordance with all State, Local, and Federal regulations.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 030510 – CONCRETE MOISTURE VAPOR REDUCTION ADMIXTURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. High performance, concrete Moisture Vapor Reduction Admixture (MVRA) for all new concrete slab-on-grade.

B. Related Sections:

1. Division 03 Section “Cast-in-Place Concrete” for cast-in-place concrete materials and placement, and vapor retarder.
2. Division 09 Flooring Sections for flooring materials installed over concrete slabs that contain integral waterproofing and for preparation requirements.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 REFERENCES

A. American Society for Testing and Materials International (ASTM):

1. ASTM D 5084: Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
2. ASTM E 1643: Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
3. ASTM E 1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
4. ASTM F 710-11 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
5. ASTM C 494/C 494M-08a: Standard Specification for Chemical Admixtures for Concrete Type S.

1.5 SUBMITTALS

A. Product Data: Manufacturer’s printed data sheets.

1. Include standard slab repair details.
2. Include vapor barrier data showing compliance with this section.

B. Product test reports performed by a qualified independent testing agency evidencing compliance of products with specified requirements of water-vapor transmission based on comprehensive testing of current products.

C. Manufacturer's certificate certifying admixture provided meets or exceeds specified requirements.

D. Sample warranty, including adhesion guarantee and moisture letter.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm with not less than ten (10) years' experience in the manufacture of the specified concrete moisture vapor reduction admixture, capable of providing test reports indicating compliance with specified performance requirements, and able to provide on-site technical representation should the need arise. Selected product must have certification of compliance with ASTM C494 /C494M testing protocols from an independent AASHTO approved laboratory.

B. Preinstallation Conference: Conduct at Project site.

1. Verify all are familiar with MVRA project specific quality control procedures, review concrete mix designs and examine procedures for ensuring quality of concrete materials. Each entity directly concerned with MVRA dosed concrete must attend in person, conference call, or provide electronic review of documents, mix designs and procedures. Those required to participate or to review include but are not limited to:

    a. Contractor.
    b. Independent testing agency responsible for concrete design mixtures, sampling and testing.
    c. Ready-mix concrete manufacturer.
    d. Concrete subcontractor.
    e. Moisture Vapor Reduction Admixture manufacturer.

C. Moisture Vapor Reduction Admixture Collection Agent / Representative Qualifications

1. Personnel conducting field sampling on behalf of the MVRA manufacturer shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

D. Quality Control Protocol shall consist of the concrete water vapor transmission inhibiting admixture representative procuring two random cylinders from every placement of concrete containing the concrete water vapor transmission inhibiting admixture. These cylinders shall be sent to an independent laboratory for hydraulic conductivity (coefficient of permeability) per ASTM D5084. The results of this "project specific" quality control protocol shall form the basis for the issuance of the project specific warranty.

1. Should the Quality Control Protocol deliver results in excess of 6.0 E-08 cm/sec, the concrete water vapor transmission inhibiting admixture manufacturer shall provide, at their expense, an epoxy topical moisture mitigation system for all areas not meeting the stated limit.

    a. The moisture mitigation system shall include all labor and material for slab profiling, epoxy material, and application.
    b. The moisture mitigation system shall include a warranty meeting or exceeding the terms of the manufacturer's warranty specified in this Section.

E. Toxicity/Hazardous Materials: Provide products that contain no urea-formaldehyde.

F. Repairs to slabs must be in accordance with concrete industry standards and meeting waterproofing admixture manufacturer's published details.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturers written instructions for handling prior to adding to concrete batch.

B. Store both components protected from exposure to harmful weather conditions and in a temperature controlled area above 36 deg F. Do not allow product to freeze.

1.8 WARRANTY

A. Special Warranty: Provide manufacturer's standard warranty documents executed by an authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights the owner may have under provisions of the Contract Documents.

1. Warranty Period: Life of the concrete.

a. Warranty requirements: Said product must be installed according to and in compliance with the manufacturer's published data sheet to include but not limited to dosing instructions, onsite representation requirements, and the use of an ASTM E 1745 vapor retarder, installed following ASTM E 1643 and ASTM F 710 guidelines; elevated concrete slabs do not require a vapor retarder.

1) MVRA Manufacturer's warranty shall include:

a) Repair and/or removal of failed flooring.
b) Placement of a topical moisture remediation system.
c) Replacement of flooring materials like original installed to include material and labor.

2) MVRA Manufacturer shall provide an adhesion warranty to match the term of the adhesive manufacturer's warranty in accordance with the MVRA manufacturer's requirements for conveyance of such.

2. Warranty Basis: Follow Quality Control Protocol specified in this Section, achieving a maximum coefficient of permeability of 6.0 E-08 cm/sec on all project test samples.

PART 2 - PRODUCTS

2.1 CONCRETE MOISTURE VAPOR REDUCTION ADMIXTURE

A. Concrete Moisture Vapor Reduction Admixture (MVRA): Concrete moisture vapor reduction admixture for all interior slabs on grade, elevated slabs, and stair treads and landings, shall be a non-toxic, liquid admixture that is specifically designed to have a natural chemical reaction with pre-existing elements inside the concrete to eliminate the route of moisture vapor emission through the slab by restricting the integral capillary system. The chemical reaction forms a permanent barrier (capillary break) that is integral to the concrete, insoluble and irremovable.

1. Basis of Design Product: Subject to compliance with requirements, provide **Concrete Moisture Solutions, Inc., Barrier One High Performance Concrete Admixture (CMS Admix)**, the following, or equal:

   a. ISE Logik Industries, Inc.; MVRA 900.

   Concrete Moisture Solutions, Inc.
   640 Garden Commerce Parkway
   Winter Garden, FL 34787
   Manufacturer's Representative: 877.224.5850; Fax: 866.594.3490.
   Email: info@cmxsadmix.com

2. Provide the above-named product or, upon approval of the Architect/Structural Engineer, provide a product that meets or exceeds the following project specific performance requirements at the expense of the concrete moisture vapor reduction admixture (MVRA) manufacturer:

   a. Project specific quality control process to include, but not be limited to:

      1) Independent procurement of one cylinder per day of placement of concrete containing MVRA.
      2) Independent testing of all cylinders for hydraulic conductivity per ASTM D 5084.
      3) Assessing each cylinder for maximum flow of 6.0 E-08 cm/sec.
      4) Should any cylinder exceed the maximum flow, procure a core from that day's placement.
      5) Independently test core for hydraulic conductivity per ASTM D 5084.
      6) Should any core exceed the maximum flow, provide a topical moisture mitigation system for all areas not meeting the stated limit; moisture mitigation system to include all labor, material and warranty that meets or exceeds the terms of the concrete moisture vapor reduction admixture manufacturer's warranty.

2.2 MATERIALS

A. Concrete Water Vapor Transmission Inhibiting Admixture: Non-toxic, liquid admixture for concrete that reacts with water and portlandite filling the capillary system with calcium silicate hydrate (CSH) to eliminate the route for moisture migration. Once the admixture is added to the mix design, the admixture shall react with the water to allow the concrete to be flexible, even at low slump.

   1. Product Description: Concrete water vapor transmission inhibiting admixture shall be a complex formula that is free of all volatile organic compounds (VOC). It shall be specifically designed to have a natural chemical reaction with pre-existing elements inside the concrete to eliminate the route of moisture vapor emission through concrete by closing down the integral capillary system. The chemical reaction shall form a permanent barrier (capillary break) which is integral to the concrete and irremovable.

      a. Water Vapor Transmission: 0.20 US perms per ASTM D 5084
      b. Appearance: Colorless
      c. Odor: None
      d. Toxicity: None
      e. Flammability: None
      f. Ph: 11.3
      g. Shelf Life: Indefinite
      h. Weight: 10.3 lbs per gallon

i. Freeze Temp: 32°F
j. Storage Temp: Above 36°F
k. Solvent: Water
l. Acid Resistance: Excellent
m. Hazardous Vapors: None
n. Capillary Break: Calcium Silicate Hydrate Gel
o. Installation: All concrete
p. VOC Levels: Zero

2.3 RELATED MATERIALS

A. Sheet Vapor Retarder: ASTM E 1745-09 compliant vapor barrier maintaining a permeance of 0.1 US perms (grains/ft^2*hr*inHg) or less after the required product conditioning specified in ASTM E 1745-09, with a minimum thickness of 0.01-inch (10 mils). Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: As specified in Division 03 Section "Cast-in-Place Concrete", indicating compliance with required perm rating after product conditioning specified in ASTM E 1745-09. Final approval is with moisture vapor reduction admixture manufacturer.

PART 3 - EXECUTION

3.1 APPLICATION

A. Install vapor barrier following ASTM E 1643-98(2005) guidelines and in accordance with Division 03 Section "Cast-in-Place Concrete."

B. Moisture Vapor Reduction Admixture: Add Barrier One Admixture in accordance with manufacturer's recommendations to all ready-mix concrete, at the batch plant or at the job site.

1. A representative or agent of Barrier One Admixture must be present at the jobsite during the placement of all treated concrete. Do not proceed without the Barrier One representative being present for the certification of the mix and placement process. Provide minimum 10 days notice of the placement of the treated concrete.
2. The Quality Control Protocol for Barrier One Admixture shall consist of the Barrier One representative procuring two random cylinders from every placement of concrete containing Barrier One Admixture. These cylinders will be sent to an independent laboratory for hydraulic conductivity (coefficient of permeability) per ASTM D5084. The results of this "project specific" quality control protocol forms the basis for the issuance of the project specific warranty.

C. Dispense Barrier One admixture at a rate of 14 oz. per 100 lbs. of cementitious materials at the tail end of the load, dose to be within plus or minus 3 percent. Additional dosage may be required based on the mix design.

1. Add Barrier One Admixture to ready mix concrete truck, in the require dosage, and mix for 7 (seven) minutes before discharge. Barrier One Admixture is to be used in lieu of designed mix water, not in addition to mix water.
2. Do not alter 0.45 water/cementitious materials ratio without prior approval.
3. The addition of non-chlorinated admixtures is permitted.
4. The addition of Shrink Reducing Admixtures is **not** permitted.

D. Freshening onsite with held back mix water is acceptable so long as the practice is in accordance with published ACI guidelines and does not exceed the original water to cementitious material ratio or instructions of the Architect / Structural Engineer.

E. Other admixtures may be used in the same concrete batch with Barrier One provided that such admixtures are added separately.

1. The water-to-cementitious material ratio (w/cm) is critical and it is imperative to comply with the mix design. Barrier One is used in lieu of that portion of the mix water, not in addition to the mix water.
2. Use of water reducing admixtures is recommended to achieve slumps greater than 4 inches.

3.2 CURING

A. Comply with curing requirements in Division 03 Section “Cast-in-Place Concrete” and as follows:

1. Cure concrete slabs to receive moisture sensitive coatings according to ACI 302.2R-06, by one or a combination of the following methods:

a. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure concrete containing MVRA for not less than 24 hours, longer if ambient conditions are hot, windy, and sunny or subject to periods of very low humidity. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
b. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
c. Removal: After curing period has elapsed, mechanically remove curing compound prior to the installation of final flooring material in accordance with ASTM F-710.

1) Do not chemically remove.

3.3 FIELD QUALITY CONTROL

A. Testing of Slabs Containing MVRA:

1. The moisture vapor reduction admixture (MVRA) manufacturer will perform all moisture testing in accordance with this specification and will issue project specific warranties and adhesion guarantees prior to installation of any slab finishes; no further field slab moisture nor pH testing shall be required.

a. Failure to provide a product that meets or exceeds these requirements will result in all subsequent testing and slab remediation costs being borne by the Contractor.

2. A representative or agent of the moisture vapor reduction admixture (MVRA) manufacturer must be present at the jobsite during placement of all MVRA treated concrete.

a. Do not proceed without this representative being present.
b. A minimum of one business day notification is required.

3. Field testing technician shall, at the expense of the MVRA Manufacturer, procure at least one 4 inch cylinder from every day of placement of MVRA dosed concrete for the purpose of subsequent hydraulic conductivity/coefficient of permeability testing.
4. All cylinders shall be independently lab tested in accordance with ASTM D 5084 at the expense of the MVRA manufacturer.
5. Test results must conform to specified limits.

    a. Should any cylinder from any day of placement deliver results in excess of 6.0 E-08 cm/sec, the concrete moisture vapor reduction admixture manufacturer shall procure, at their expense, a core (or cores) from that day of placement. This core (cores) shall be sent to an independent laboratory for hydraulic conductivity (coefficient or permeability) per ASTM D 5084.
    b. Should any core deliver results in excess of 6.0 E-08 cm/sec per ASTM D 5084, the concrete moisture vapor reduction admixture manufacturer shall provide, at their expense, a topical moisture mitigation system for all areas not meeting the stated limit.

6. Proceeding with placement of concrete dosed with the MVRA without the required representation will result in the contractor bearing the cost to core and ship appropriate material for testing per ASTM D 5084.

B. Concrete Water Vapor Transmission Inhibiting Tests: If the results of the testing of the original cylinders is inconclusive, additional testing of slabs containing concrete water vapor transmission inhibiting admixture shall be carried out by the concrete water vapor transmission inhibiting admixture manufacturer's technical representative to include: Two random, 4-inch drilled sample cores and/or cylinders on all project slabs.

C. The sample cores and/or cylinders shall be sent to an independent laboratory and tested for permeability in accordance with ASTM D 5084, and shall achieve a minimum 6.0 E-08 cm/sec. The results shall be provided to the Owner and Architect prior to the installation of floor coverings and as part of the warranty closeout documents.

1. The manufacturer's warranty must be in place prior to installation of flooring materials.
2. All adhesives used for flooring installation must be compatible with the MVRA and manufactured for non-porous surfaces. Comply with Division 09 Sections for installation.

D. Additional testing may be required in accordance with the water vapor transmission inhibiting admixture manufacturer's requirements. No other testing shall be required for installation of floor coverings.

3.4 REPAIRS

A. Make repairs to slab in accordance with Division 03 Section "Cast-in-Place Concrete" and as shown in manufacturer's published details and remediation program.

END OF SECTION 030510

SECTION 031004 - CONCRETE FORMWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including the General and Supplementary Conditions, apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Furnish all labor, supervision, materials, tools and equipment necessary for, or incidental to the completion of the formwork for cast-in-place concrete as shown on the Contract Drawings and/or as specified.

B. Built-In Inserts

1. Install built-in anchors, anchor bolts, inserts, sleeves, angles, bolts, etc, as required under other Divisions shall be furnished by such trades.

1.3 RELATED WORK

A. Section 032004 - Concrete Reinforcement
B. Section 033004 - Cast-in-Place Concrete

1.4 QUALITY ASSURANCE

A. Design Criteria

1. Design of formwork shall conform to ACI 318 Chapter 6 and ACI 347, Chapter 2. The design and engineering of the formwork, as well as the construction, shall be the responsibility of the Contractor. Formwork shall be designed to support gravity and wind loads as specified by the State Building Code. Allowable stresses shall meet applicable requirements of the State Building Code.

2. Formwork shall be mortar tight, sufficiently rigid and strong to prevent sagging or springing between supports and to maintain true position and shape during and after placing of concrete, without waves, bulges, or other defects in finished concrete surfaces.

3. Erection and removal of formwork shall conform to the requirements of ACI 301, Section 2, except as modified herein.

B. Allowable Tolerances

1. Erect and maintain concrete forms so as to insure completed work within the tolerance limits of

ACI-117, unless otherwise noted in the Contract Documents.

1.5 SUBMITTALS

A. Contractor shall submit shop drawing to the Engineer for review of temporary shoring locations and locations of any construction, control or expansion joints to be used in all walls and slabs, as outlined in Section 03200 Concrete Reinforcement.

B. The Contractor shall submit fully detailed shop drawings for all permanent metal forms to the Engineer for review. Shop drawings shall include form thicknesses, physical dimensions, accessories, coatings and method of attachment to supporting structure.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conform with ACI 347, Chapter 3.

B. Unexposed surfaces may be formed with dressed matched lumber, free from loose knots or major defects.

C. Exposed concrete surfaces shall be formed with three-quarter (3/4") inch thick sound plywood without patches, A.P.A. Plyform Ext. B-B, using a minimum of pieces and placed symmetrically.

D. Chamfer strips shall be new half-inch (1/2") 45 degree wood strips, nailed six (6") inches on center, and installed in inside corners of forms.

E. Form releasing agent shall be a clear, non-staining material the approved equal of Nox-Crete.

PART 3 - EXECUTION

3.1 INSPECTION

A. The Contractor shall notify the Engineer twenty-four (24) hours prior to placing foundation forms for examination of soil bearing material.

3.2 PREPARATION OF WOOD FORM SURFACES

A. All forms shall be coated with a non-staining form release agent compound before the reinforcement is placed.

B. Forms shall be thoroughly cleaned and recoated with form release agent before re-use.

3.3 INSTALLATION OF TEMPORARY FORMS

A. Construct forms to shape, grade and dimensions shown, sufficiently tight to prevent leakage. Joints shall be placed on true vertical and horizontal axis.

B. Side forms shall be used for footings and grade beams.

C. Erect formwork and adequately support, brace and maintain so as to safely support construction loads and to remain in correct position during and after placing concrete without displacement.

D. Forms for external corners of exposed members shall be accurately fitted and securely fastened. Install beveled chamfer strips nailed at six (6") inches on center, in corners of all exposed members to provide a three-quarter (3/4") inch chamfer, measured at the diagonal face.

E. Forms shall be recessed to receive anchor bolts and bearing plates.

F. Formwork shall be pitched as required to meet finished slab elevations as shown on the Contract Drawings, to maintain the depth of any slab or beam. Camber formwork as shown on Contract Drawings to meet tolerances.

G. Attach to formwork as required items such as preformed reglets, and any other anchors, inserts, bolts, or sleeves. Coordinate with requirements of all other Divisions' work for proper lines and spacing.

H. Provide cleanout panels at bottom of walls and columns for cleaning and inspection.

I. Keys shown shall be two (2") inches deep by one-third (1/3) the total thickness, and beveled unless otherwise noted.

3.4 WALL CONSTRUCTION JOINTS

A. Unless otherwise shown on the Drawings, foundation walls shall have vertical construction joints located no more than sixty-five (65') feet apart. No vertical construction joint shall be within four feet zero inches (4'-0") of any column pier, corner or footing joint.

B. See Section 03300 for Slab Construction Joint Requirements.

3.5 TIES

A. Where vertical surfaces are exposed in either exterior or interior areas, use wood cone snap ties with one and one-half (1 1/2") inch break back.

B. Locate form ties for exposed concrete in horizontal rows and vertical tiers. Drill forms to suit ties used. Do not splinter forms by driving ties through improperly prepared holes.

3.6 REMOVAL OF FORMWORK

A. The Contractor shall be solely responsible for construction during and after form removal.

B. Formwork for footings may be removed twenty-four (24) hours after placing of concrete.

C. Formwork not supporting the weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may not be removed in less than seventy-two (72) hours after placing the concrete, and provided that curing and protection operations are maintained.

D. Formwork supporting the weight of concrete, such as beam soffits, joists, slabs and other structural elements of work, may not be removed in less than fourteen (14) days or until the concrete has attained a minimum strength to carry its own weight and any approved superimposed load, which at no time shall exceed the design live load of that floor.

E. No construction loads exceeding the dead load plus live load shall be supported on any unshored portion of the structure under construction. No construction loads shall be supported on, nor any shoring removed from, any part of the structure under construction except when that portion of the structure in combination with the remaining forming and shoring system has sufficient strength to support safely its weight and the loads placed thereon.

F. Exercise care in form removal to prevent chipping of corners or other damage to concrete. Any damage to concrete shall be patched as per Section 03300 Cast-in-Place Concrete.

END OF SECTION

SECTION 032004 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including the General and Supplementary Conditions, apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Furnish all labor, supervision, materials, tools and equipment necessary for, or incidental to completion of the concrete reinforcement for cast-in-place concrete as shown on the Contract Drawings and/or specified.

1.3 RELATED WORK

A. Section 031004 - Concrete Formwork
B. Section 033004 - Cast-in-Place Concrete

1.4 QUALITY ASSURANCE

A. Allowable tolerances: Fabricating and placing tolerances as outlined in ACI 301, Section 3, except as modified by these specifications.

1.5 SUBMITTALS

A. Shop Drawings

1. The Contractor shall submit detailed drawings which clearly show location, splicing, cover, sizes, and spacing of all reinforcing and wire fabric. Schedules and diagrams shall indicate bends, sizes, and lengths of reinforcing members. All reinforcement in concrete walls and grade beams shall be shown in elevation one eighth inch equals one foot zero inch (1/8" = 1'-0") scale. All construction joints, as required on the Contract Drawings or requested by the Contractor, shall be shown with any additional reinforcement required. Show and locate all concrete openings, including those required for other Divisions. Any drawings submitted without showing construction joints and openings will be rejected and will not be reviewed.

B. No reinforcing shall be cut, fabricated, shipped on the job site or placed before shop drawings are reviewed. Only shop drawings bearing the Engineer's stamp marked "Furnish as Submitted" or "Furnish as Corrected" shall be used in the field.

C. Certificate

1. The manufacturer shall submit to the Engineer certified test results stating that the reinforcing

steel and welded wire fabric conform to the chemical composition and tensile and bending requirements as outlined in ASTM A615 and ASTM A185.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to the project site in bundles, marked with metal tags indicating bar size, grade and length.

B. Store reinforcing on skids or other supports above ground and protect from any damage or surface contamination, which would impair its bonding qualities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All reinforcing bars shall conform to the requirements of ASTM A615, Grade 60.

B. Welded wire fabric shall conform to the requirements of ASTM A185.

C. Metal Accessories

1. Provide all spacers, chairs, ties, clips and other devices required for proper placement.

D. Epoxy adhesive shall be HIT HY 200 as furnished by Hilti, Inc., Tulsa, Oklahoma.

2.2 FABRICATION

A. Bar reinforcing shall be fabricated cold to dimensions given on the Contract Drawings. Conform to ACI standards 318 and 315 for forming hooks and bends and for detailing, fabricating, and erecting reinforcement.

B. Reinforcing shall be accurately formed to dimensions on drawings, details and schedules within the following tolerances:

Sheared Length.....±1 inch
Stirrups, Ties and Spirals.....±1/2 inch
All Other Bends.....±1/2 inch

C. Reinforcing shall be bent cold and shall not be straightened or bent in a manner that will injure the materials.

PART 3 - EXECUTION

3.1 INSPECTION

A. The Contractor shall notify the Engineer twenty-four (24) hours prior to placing concrete to inspect secured reinforcing. No concrete shall be placed until reinforcing has been inspected.

3.2 INSTALLATION

A. Placement

1. Reinforcement shall be free of paint, dirt, oil, or excessive scale or rust that might reduce its bond strength with concrete.

2. Reinforcement shall be accurately placed and secured against displacement before and during the placing of concrete. Provide metal chairs, supports, and spacers to secure steel in correct horizontal and vertical position. Conform to "Recommended Practice for Placing Reinforcing Bars" (CRSI) in spacing of bolsters for slab and beam bottom reinforcing and in spacing of support bars on continuous high chairs for top slab reinforcement. The use of individual high chairs is prohibited.

3. No welding of bars will be allowed.

4. For exposed concrete in soffits or ceilings, bar supports shall be stainless steel, plastic, or have plastic ends of an approved type in contact with forms.

5. Reinforcement shall stop at expansion joints and continue through construction joints.

6. All reinforcing bars shall be supported and wired together to prevent displacement by construction loads or the placing of concrete beyond the tolerances specified below. On ground, solid concrete blocks, made of 3000 psi concrete, shall be used to support any reinforcing bars in slabs. Surfaces of blocks shall be sufficiently rough to insure proper bond with cast-in-place concrete. Reinforcement shall be secured against displacement with annealed iron wire ties or suitable clips at all intersections, except reinforcing for footings may be wired at alternate intersections.

B. Cast-in-Place Concrete Reinforcing Cover

1. Footing and grade beams cast against and permanently exposed to earth .....3"

2. Walls, #6 bars and larger .....2"

3. Piers, #5 bars, 5/8 in., wire and smaller ..... 1 1/2"

4. Structural Slabs:

   a. Not exposed to weather or in contact with the ground ..... 3/4"
   b. Exposed to weather or in contact with the ground .....1"

5. Beams, girders, columns: Principal reinforcement, ties, stirrups or spirals ..... 1 1/2"

C. Reinforcing Placing Tolerances

1. Place reinforcing as shown on drawings and schedules within the following tolerances:

Cast-in-Place Concrete Cover
to Formed Surfaces ..... + 1/4 inch

Depth to Steel Reinforcing of:
24" or Less ..... + 1/4 inch
More than 24" ..... + 1/2 inch

Longitudinal Location of Bends
and Ends of Bars, Except at
Ends of Members ..... + 2 inches

D. Splicing

1. Lap splices - tie securely with wire to prevent displacement during placement of concrete.

2. Splice bars only at the locations and to the lengths shown on the Contract Drawings or as accepted on the Shop Drawings.

E. Welded Wire Fabric

1. Fabric shall be shipped in flat sheets.

2. Wire fabric end and side laps shall be even multiple of wiring spacing and shall be not less than six (6") inches.

3. Wire fabric reinforcement for structural slabs shall be supported on continuous high chairs at all slab support member locations.

4. Wire fabric reinforcement for slabs on grade shall be placed in the upper third of slab depth.

5. Wire fabric for slabs on grade shall be supported on masonry blocks or other suitable supports at a spacing not to exceed four feet zero inch (4'-0") on center.

6. All exterior slabs on grade shall contain welded wire fabric unless otherwise noted.

END OF SECTION

SECTION 033004 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including the General and Supplementary Conditions, apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Furnish all labor, supervision, materials, tools and equipment necessary for or reasonably incidental to completion of all cast-in-place concrete as shown on the Contract Drawings and/or specified herein.

B. Work shall include all footings, piers, walls, slabs on grade, retaining walls, grade beams, structural slabs, concrete stairs and platforms and beams shown on the Contract Drawings.

C. Pads and miscellaneous concrete as required for Mechanical and Electrical Divisions.

D. Set anchor bolts and leveling plates specified in Division 5, Structural Steel.

E. Place all anchors, inserts, dovetail slots, hangers, sleeves and etc. which must be encased in concrete for other Divisions.

1.3 RELATED WORK

A. Section 031004 – Concrete Formwork
B. Section 032004 – Concrete Reinforcement

1.4 QUALITY ASSURANCE

A. Standards

1. Concrete work shall conform to all requirements of ACI-301 “Specifications for Structural Concrete” latest edition.

2. Design of concrete shall conform to all requirements of ACI-318 “Building Code Requirements for Structural Concrete” latest edition.

B. Testing Agency

1. The Owner will engage and pay for an independent commercial testing laboratory to test concrete used on this project.

2. Testing required under Section 2.02, Proportions, shall be by an independent commercial laboratory as approved by the Engineer, and at the Contractor's expense.

C. Quality Control

1. Compression Tests

a. Tests shall be made in conformance with ASTM C39. Each test shall consist of four (4) cylinders made and tested by the laboratory during the progress of the project, testing as follows:

i. One (1) - after curing seven (7) days in the field.
ii. Three (3) - after curing twenty-eight (28) days in the laboratory.

b. At least one (1) test shall be made every one hundred (100 cy) cubic yards of concrete or fraction thereof, placed in any one concreting operation on any given day.

c. Concrete for each set of cylinders shall be from any one (1) sample, representative of the entire batch.

d. Specimens shall be made, cured and tested in accordance with ASTM C31.

e. When concrete is pumped, test cylinders shall be made from concrete taken at the discharge end of the pumping train.

2. Additional tests as follows shall be made from the concrete taken to mold the cylinders.

a. Slump test - in accordance with ASM C143.

b. Air-entrainment test - in accordance with ASTM C173 or ASTM C231.

3. The Contractor shall notify the Engineer and the testing laboratory twenty-four (24) hours before concrete placement and shall cooperate in making of cylinders by the testing laboratory.

1.5 STORAGE AND HANDLING

A. Store materials protected from exposure to harmful weather conditions and at a temperature above 40°Fahrenheit.

1.6 WARRANTY FOR SLAB WATERPROOFING ADMIXTURE

A. Project warranty: Refer to Conditions of the Contract for project warranty provisions.

B. The manufacturer's standard warrantee document executed by an authorized company official. The manufacturer's warrantee is in addition to, and not a limitation of, other rights the owner may have

under provisions of the Contract Documents.

1. Warrantee Period: Five years commencing on the date of acceptance of the property by the Owner or Notice of Completion.

C. Warrantee terms: Terms in include moisture related failures, including all finish floor materials and labor. Testing of slabs containing Barrier-1 Waterproofing Admixture will be coordinated by Barrier-1 to include drilled sample cores on all project slabs. The sample cores will be sent to the project testing laboratory and tested for permeability. The results will be provided as part of the warranty closeout documents.

1.7 SUBMITTALS

A. Test Reports

1. Report of tests shall be submitted to the Engineer and shall include: name of job, date and location of placement, class of concrete, mix data, and slump, air content, compressive strength, age and condition of test cylinders, type of fracture, and method of curing.

2. One (1) copy of all test reports shall be promptly forwarded by the testing laboratory to the Engineer, plus one (1) copy each to the Architect, Contractor and Concrete Supplier.

B. Test Results

1. The average of the tests for any portion of the structure shall equal or exceed the specified twenty-eight (28) day compressive strength (fc).

2. No single strength test shall have a value less than 90% of the specified compressive strength (fc).

3. Where the concrete does not comply with these requirements, the Engineer may require other tests, such as cored cylinders (in conformance with ASTM C42) or load tests, all at the Contractor's expense. Should the concrete fail to pass such tests, it shall be removed and replaced at no additional cost to the Owner. In addition, the Contractor may be required to remove and replace sound portions of structure as necessary to insure safety, appearance, and durability of the structure. Additional load tests strengthening or removal and replacement of parts of structure and any costs associated with delay of projects shall be at Contractor's expense.

C. Concrete Proportions

1. See Section 2.02A thru 2.02J for additional requirements.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Cement: domestic portland cement conforming to ASTM C150, Type I or Type II.

B. Fine aggregate: natural sand conforming to ASTM C33.

C. Coarse aggregate: crushed stone or crushed washed gravel conforming to ASTM C33.

D. Water: clean, potable.

E. Admixtures: Each admixture shall be approved by the Engineer. No admixtures containing calcium chloride or other water soluble chlorides will be allowed. Each manufacturer shall submit a written notarized statement to the Engineer of the chloride content of each admixture. Formulate admixtures to avoid an increase in water-cement ratio or loss of strength.

1. Air entraining agent: ASTM C-260.

2. Retarder - Densifier: ASTM C-494, Type D.

3. Accelerator: ASTM C-494 Type C.

4. Water-reducing agent: ASTM C-494, Type A.

1. Slab vapor reducing admixture: Concrete moisture proofing admixture for interior slab construction shall be one of the following products:

   a. Barrier 1 Inc., 1901 Tumblewater Blvd., Ocoee, Florida 34761
   b. Moxie 1800 Super-Admix by Moxie International, 3352 Swetzer Road, Loomis, CA 95650
   c. Vapor Lock 20/20 by the Specialty Products Group, Inc., 6254 Skyway Road, Smithville, Ontario Canada

F. Non-shrink non-metallic grout: CE CRD C-621.

G. Curing and sealing compound: Fed. Spec. TT-C-800A Type I, ASTM C-309.

H. Polyethylene film: white opaque, reinforced six (6) mils thick.

I. Vapor barrier below slabs on grade. Vapor barrier shall meet the requirements of ASTM E1745-97(2004) Class A, with a permeance of 0.01 US perms or less.

1. Install all vapor barriers according to ASTM E 1643-98(2005) guidelines.

J. Curing paper shall be the approved equal of Sisalkraft Paper "Orange Label" that conforms with ASTM C171, Type I.

K. Premolded joint filler shall be a preformed bituminous expansion type that conforms to ASTM D-994. Joint material thickness shall be one-half (1/2") inch thick, except as otherwise indicated on the drawings.

L. Concrete moisture proofing admixture for interior slab construction shall be Barrier-1 Inc., 1901 Tumblewater Blvd.,Ocoee, Florida 34761.

M. Waterstop shall be bentonite waterstop Rx101, one inch by three-quarter (1"x3/4") inch as manufactured by American Colloid Company or approved equal.

2.2 PROPORTIONS

A. Concrete mix proportions shall be selected to produce an average compressive strength exceeding the required twenty-eight (28) day compressive strength (fc) in accordance with ACI 318 Chapter 5.3, proportioning on basis of field experience, or trial mixtures, or both. The Contractor shall submit to the Engineer the concrete strength to which the materials were proportioned, and copies of any records that the concrete supplier may have showing standard deviations in previous mixes.

B. Mix proportions shall be as outlined in ACI 301Section 4 by the testing laboratory.

C. Where a concrete production facility has a record, based on at least thirty (30) consecutive strength tests that represent similar materials and conditions to those expected, required average compressive strength used as the basis for selecting concrete proportions shall exceed required fc at designated test age by at least:

   a. 400 psi if standard deviation is less than 300 psi
   b. 550 psi if standard deviation is 300 to 400 psi
   c. 700 psi if standard deviation is 400 to 500 psi
   d. 900 psi if standard deviation is 500 to 600 psi

   1. If standard deviation exceeds 600 psi, concrete proportions shall be selected to produce an average strength at least 1200 psi greater than required fc.

D. Strength test data for determining standard deviation shall be considered to comply with Section 2.02C, if data represents either a group of at least thirty (30) consecutive tests or a statistical average for two (2) groups totaling thirty (30) or more tests.

E. Strength tests used to establish standard deviation shall represent concrete produced to meet a specified strength or strengths within 1000 psi of that specified for the proposed work.

F. Changes in materials and proportions within the population of background tests used to establish standard deviation shall not have been more closely restricted than for the proposed work.

G. After sufficient experience and test data become available from the job, using ACI 211 methods of

evaluation, the standard deviation may be reduced when the probable frequency of tests more than 500 psi below required compressive strength will not exceed one in one-hundred (1 in 100), and that probable frequency of an average of three (3) consecutive tests below required compressive strength will not exceed one in one hundred (1 in 100).

H. If it is intended to place any concrete by pumping, a corresponding mix shall be designed for such placement and so designated.

I. No concrete shall be placed until tests of design mixes show a twenty-eight (28) day average compressive strength at least equal to the specified design compressive strength or until the concrete design mix proportions have been accepted by the Engineer.

J. Contractor shall submit the following data:

1. Fine aggregate - organic content, sieve analysis, fineness modulus and specific gravity.

2. Coarse aggregate - sieve analysis and average weight loss in accordance with ASTM C-33.

3. Mix design, including cement brand, proportions of aggregate by weight, slump, water-cement ratio, percentage of air.

4. Thirty (30) twenty-eight (28) day compressive test results on proposed mix that comply with Section 2.02C.

5. Admixture-types, brand and quantity.

2.3 SPECIFIC REQUIREMENTS

A. Concrete for all the parts of the work shall be 3,000 psi at twenty-eight (28) days and meet the values shown in the following Table:

Min. compressive strength @ 28 days (psi) 3,000
Slump (inches) 2 1/2 - 4
Max. size coarse aggregate (inches)..... 1 1/2
Max. size coarse aggregate for suspended slabs
and pumped concrete (inches)..... 3/4
Max. size coarse aggregate for minimum 5 inch thick
slab on grade (inches) 1 1/2
Min. cement factor (sacks per cy) 5 1/2

1. Water content shall include surface water in aggregates.

B. Concrete for Interior Slabs shall also conform to the following requirements:

Min. compressive strength @ 28 days (psi) 3,000

Maximum water cement ratio shall be 0.48
Min. cement factor (sacks per C.Y.) 5 1/2

1. Mix shall include a mid-range water reducer such as Polyheed 997 as manufactured by Master Builders, Inc. or equivalent.

2. Mix shall be proportioned to provide a maximum 5" slump at point of discharge.

3. Interior concrete slabs-on-grade shall not be air entrained.

4. Add Barrier-1 Admixture in strict accordance with manufacturer's recommendations.

C. Concrete for exterior flatwork shall be 4,000 psi at twenty-eight (28) days and meet the values shown in the following Table:

Min. compressive strength @ 28 days (psi) 4,000
Slump (inches) ..... 2 1/2 - 4
Max. size coarse aggregate (inches) 1 1/2
Max. size coarse aggregate for suspended slabs
and pumped concrete (inches) 1
Max. size coarse aggregate for minimum 5 inch thick
slab on grade (inches) 1 1/2
Min. cement factor (sacks per cy) 6 1/2

1. Water content shall include surface water in aggregates.

D. All concrete exposed to the weather, including site work, shall be air-entrained as follows:

Maximum Size Aggregate	Air Content % by Volume
1 1/2 inch	4 - 7
1 inch	4.5 - 7.5
3/4 inch	4.5 - 7.5
1/2 inch	5.5 - 8.5
3/8 inch	6 – 9

E. Variations of proportions may be permitted to produce more workable materials on approval by the Engineer.

PART 3 - EXECUTION

3.1 PRIOR TO PLACING CONCRETE

A. Soil bottoms for footings and slabs shall be accepted by the Engineer before placing concrete. The subgrade shall be free of frost before concrete placing begins.

B. All debris, sawdust, ice, etc., is to be cleaned from place of deposit before concrete is placed.

C. All water is to be removed from place of deposit before concrete is placed. Provide drainage or pumping as required to maintain dry excavation until concrete has taken initial set.

D. All conduits and piping are to be dug into subgrade sufficiently so as to provide uniform slab thickness.

E. Prior to placing any concrete, the Contractor shall notify the Engineer twenty-four (24) hours in advance so that formwork and reinforcing may be inspected. Do not place concrete until inspection has been made or waived.

F. All dowels, anchor bolts, sleeves, inserts and other embedded items shall be set with the aid of templates and shall be securely positioned in place prior to the placement of concrete.

3.2 MIXING

A. Concrete shall be ready-mixed in conformance with the requirements of ASTM C94 for measurement of materials, batching, mixing and delivery, and shall bedischarged within one and one-half (1 1/2) hours after water is first added to the mix, except that in unusually hot weather, this maximum time may be reduced.

B. Mixing and conveying equipment shall be thoroughly clean and free from hardened concrete and foreign materials before concrete operation is started.

C. All materials including water shall be added to ready-mixed concrete at the batching plant. Water shall not be added to the mix on the project site. Mixing shall be continued for at least one and one-half (1 1/2) minutes prior to its use.

D. Mixer shall produce thoroughly mixed, uniform mass, and discharge mixture without segregation. Entire batch shall be discharged before mixer is recharged.

E. Partially hardened concrete shall not be retempered or used.

F. Delivery Tickets

1. One (1) copy of all concrete delivery tickets shall be furnished to the Engineer on request. Contractor shall note on tickets location of placement. Delivery tickets shall provide the following information:

    a. Date and truck number
    b. Name of ready-mix batch plant
    c. Contractor and job location
    d. Cement brand, type mix number and weight in pounds
    e. Fine aggregate weight in pounds

f. Maximum size of aggregate
g. Coarse aggregate weight in pounds
h. Water in gallons
i. Admixture, name and amount in concrete, if any
j. Amount of concrete in cubic yards
k. Time mix left plant

3.3 DEPOSITING CONCRETE

A. Depositing of all concrete shall be in accordance with ACI 304.

B. Concreting shall conform to the requirements of ACI 305 or ACI 306 in hot or cold weather as required. See Section 3.09.

C. All Contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

D. Unless adequate protection is provided, and approved by the Engineer, concrete shall not be placed during rain, sleet, or snow.

E. Concrete shall be conveyed from the mixer to the place of final deposit in a practically continuous flow by methods which will prevent the separation or loss of the ingredients. It shall be placed in the forms or on grade as nearly as practicable to its final position and shall be thoroughly vibrated around all reinforcing bars and mesh to assure complete absence of voids. Under no circumstances shall partially hardened concrete be placed in the work. Concrete shall be prohibited from free-falling in excess of four (4) feet.

F. Concrete may be pumped. Use of aluminum alloys in the pumping train is prohibited.

G. Concrete shall be thoroughly compacted and worked into the forms and around the reinforcing by means of suitable mechanical vibrators. Sufficient vibrators shall be on hand to allow for breakdowns. Vibrators shall be run deep into the concrete and shall remain in one position until the concrete is thoroughly compacted, but not long enough to cause segregation of the aggregates.

H. Vertical lifts shall not exceed eighteen (18") inches. Vibrate through successive lifts to avoid pour lines. Vibrate first lift thoroughly until top of lift glistens to avoid stone pockets, honeycomb, and segregation.

I. Concrete shall be deposited continuously, and in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within section. If section cannot be placed continuously between planned construction joints, as specified, field joint and additional reinforcement shall be introduced so as to preserve structural continuity. Engineer shall be notified in any such case.

J. Unless otherwise permitted, the work shall be so executed that a section begun on any day shall be completed in daylight on the same day.

K. Cold joints, particularly in exposed concrete, including "honeycomb", are unacceptable. If they occur in concrete surfaces exposed to view, Engineer may require that entire section in which blemish occurs be removed and replaced with new materials at Contractor's expense.

3.4 INTERIOR SLABS

A. Add Barrier-1 Admixture in strict accordance with manufacturer's recommendations to all ready mix concrete to be placed for interior slab construction at the batch plant or at the job site at a rate of 14 oz per 100 lbs of cementitious materials. The minimum amount shall be 50 oz per cubic yard.

1. A Representative of Barrier-1 Admixture must be present at the jobsite during mixing and placement of the first batch of treated concrete. The Contractor must not proceed without the Barrier-1 Representative being present for the certification of the mix and placement process. Please provide 10 days notice of the placement of the first batch of treated concrete.

2. Manufacturer's onsite mixing instructions:

a. Add Barrier-1 Admixture to ready mix concrete truck, in the required dosage, and mix for seven (7) minutes before discharge at the jobsite. Barrier-1 Admixture is to be used in lieu of designed mix water, not in addition to mix water.

b. Do not alter 0.45 water cementitious materials ratio.

c. The addition of non-chlorinated admixture is permitted.

3.5 CONSTRUCTION AND CONTROL JOINTS

A. Walls, Columns, Beams, and Slab on Grade, and Structural Slab

1. No additional construction joints, except those shown on the Contract Drawings, accepted on the shop drawings, or accepted by the Engineer will be allowed.

2. The surface of the concrete at all joints shall be hard and thoroughly cleaned prior to placing adjoining concrete.

3. The cured or partially cured concrete of construction joints, except at locations noted below, shall be dampened (but not saturated) immediately prior to the placing of fresh concrete.

4. The face of hardened concrete joints in exposed work and joints in the middle of beams, girders and slabs shall be dampened (but not saturated) and then thoroughly covered with a coat of neat cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surfaces and at least one-quarter (1/4") inch thick on horizontal surfaces.

The fresh concrete shall be placed before the grout has attained its initial set.

5. Construction joints shall be constructed with reinforcing continuous through joint unless otherwise shown. All key bulkhead joints shall be constructed with a key depth of one-third (1/3) the total thickness unless otherwise shown.

6. Sawcut control joints in slabs shall be saw cut within twenty-four (24) hours of concrete placement. Control joint shall be sawed to depth of one-quarter (1/4) of the slab thickness.

7. Unless otherwise shown on the Drawings, slabs on grade shall be broken down into sections with control and/or construction joints that do not exceed six hundred fifty (650 sf) square feet area and whose dimensions do not exceed a one and one-half to one (1 1/2 to 1) ratio.

3.6 FINISHED CONCRETE SURFACES

A. Walls

1. It is the intent of this Specification that forming operations be performed in a manner which will produce sound concrete surfaces, free of bulges and
offsets, with a minimum of fins, blemishes due to form defects and honeycomb areas.

2. Any exposed concrete which is not formed as shown on the Plans, or for any reason is out of alignment or level beyond tolerance specified, or shows a defective surface, shall be considered as not conforming with the intent of these Specifications; and shall be removed from the job by the Contractor, at his expense, unless the Engineer grants permission to patch the defective area.

3. Immediately after removing forms, all concrete surfaces shall be inspected and any pour joints, voids, pockets, or other surface defects shall be repaired at once, before the concrete is thoroughly dry.

4. Cut out surface defects which do not impair structural strength to 1 inch depth and refill with fresh concrete. Thoroughly wet cuts immediately prior to filling with stiff concrete of approximately the same mix as the adjoining work. After a partial set, compress and rub to produce a finish similar in texture and color to adjoining work.

5. Clean all exposed surfaces, concrete and adjoining work stained by the leakage of concrete.

6. Remove wood cones remaining after the rods are snapped off, and fill holes with a concrete mortar finished to the same color and texture of surrounding concrete.

7. All surfaces on both the interior and exterior, which are exposed or are within six (6) inches of being exposed in the completed building, shall have a "rubbed finish" (i.e., smooth rubbed finish, or grout cleaned finish). Parging will not be accepted. Finish all rubbed concrete surfaces in accordance with ACI 301, Section 5.3.3.4.

8. Do not clean, rub or patch in freezing temperatures, or when frost is on concrete surface.

9. Permission to patch does not imply waiver of Engineer's right to require complete removal and replacement of said work if, in Engineer's opinion, said patching does not satisfactorily restore quality and appearance of work.

B. Slabs Finishing

1. All interior concrete slabs shall be finished by screeding, floating, floated finish, and steel troweled to a smooth even surface in accordance with ACI 301, Section 5.3.4, unless otherwise noted.

2. All exterior steps and slabs and interior slab scheduled for toppings shall be finished by screed floating, floated finish and broom finish in accordance with ACI 301, Section 5.3.4.

3. Any slab surface finish not specified shall be finished in accordance with ACI 301, Section 5.3.4.2.j.

4. No dry cement or other materials shall be applied to surface of any concrete slab to absorb moisture prior to finishing.

5. Provide a positive pitch to all floor drains as shown. Pitch exterior slabs away from the building as shown on the Drawings.

6. Provide one-eighth (1/8) inch radius tooled edging at all exposed slabs and/or sidewalk edges.

7. Provide proper depression in concrete to accept specified finish floor materials.

C. Stairs

1. Stair treads, landing slabs, and platforms shall be floated and given a troweled finish, as outlined above.

3.7 TESTING

A. Testing of slabs containing Barrier-1 Waterproofing Admixture will be carried out by Barrier-1 to include: drilled sample cores and/or 4" cylinders on all project slabs. The sample cores and/or cylinders will be sent to an independent laboratory and tested for permeability, and the result will be provided to the General Contractor/Project Manager prior to the installation of floor covering as part of the warranty closeout documents.

3.8 CURING

A. All concrete shall be kept constantly moist and protected against any drying action for not less than seven (7) days after placing of the concrete, and shall be accomplished in the following manner:

1. Walls, Beams and Columns

    a. Formwork shall not be removed for a minimum of three (3) days.
    b. For the remainder of the curing period, the concrete shall be kept moist by the application of absorptive mats or other moisture retaining covering as accepted by the Engineer, kept continuously wet or curing compounds. Application of curing compound is to follow immediately behind form removal to prevent surface from drying out.

2. All slabs, either slab on grade or suspended slabs, shall be cured using curing paper.

3. Where concrete is cured by curing paper, cover surface immediately after finishing. Joints shall be lapped five (5") inches, and squeegee curing paper to remove wrinkles. Repair all rips and tears until end of curing period.

4. The use of curing compounds on exterior slab on grade construction (sidewalks) is not permitted.

3.9 CONCRETING PRECAUTION FOR WEATHER EXTREME

A. Cold weather: Precautions shall be taken when the temperature is at or below 40 degrees F, or at 45 degrees F and falling, in accordance with "Guide to Cold Weather Concreting", ACI 306.

1. Set up a proper enclosure and heat to 50 degrees F for at least four (4) hours before starting any pour.

2. Use a water-reducing admixture with an accelerated set, but do not use or rely upon any materials as an "antifreeze".

3. Use vented heaters with blowers so placed that they do not produce localized hot spots which may dry out the concrete.

4. Maintain the temperature of the concrete at not less than 50 degrees F for seventy-two (72) hours and at above freezing for an additional seven (7) days. The temperature shall then be allowed to drop gradually to the exterior air temperature before the enclosure is removed at the rate of not more than 5 degrees F per hour nor 50 degrees F in any twenty-four (24) hour period before discontinuing.

5. All frozen concrete shall be removed from the job and replaced.

B. Hot weather: Precautions shall be taken when the temperature is at or above 75 degrees F, or at 70 degrees F and rising, in accordance with "Guide to Hot Weather Concreting", ACI 305. No concrete shall be placed when the air temperature is above 90 degrees F, unless the air is still and relative humidity is above eighty (80%) percent.

1. Set up proper windbreakers for concrete surfaces wherever the relative humidity is less than 70% for slight air motion or 80% for light breezes.

2. Provide shade for placements otherwise exposed to the sun.

3. Concrete is to be at a temperature of 80 degrees F, or less when placed. If necessary, the batching plant shall cool the aggregate by spraying or by using chilled water or ice. All such water shall be accounted for as part of the mixing water.

4. Use an admixture with a retarded set.

5. All forms shall be thoroughly wetted at least daily, and more often when the relative humidity is low.

6. For slabs, maintain the required materials for curing at hand so they may be placed immediately upon steel troweling. When the concrete temperature of any slab goes above 100 degrees F, place a layer of sand on it and keep it continuously wet until the temperature is below 90 degrees F.

3.10 CONCRETE MOUNTS FOR MECHANICAL EQUIPMENT

A. Furnish and place all concrete platforms, curbs, piers, etc., required for mechanical equipment as called for in the Mechanical Drawings. Set all anchor bolts, etc., as required.

3.11 GROUTING

A. Install non-shrink grout under all structural steel column base plates, leveling plates and bearing plates.

B. Non-shrink grout shall be mixed in accordance with the manufacturer's printed instructions. Bedding grout shall be placed solidly between the bearing surface and base or plate to ensure that no voids remain. Finish edges at 45 degree bevel and properly cure grout.

3.01 WATERSTOP INSTALLATION

A. Provide continuous waterstop at all locations shown on the Plans.

B. Apply adhesive primer to vertical surfaces prior to applying bentonite strip. Nail bentonite strip using concrete cut nails at one foot zero inch (1'-0") on center.

C. Install waterstop in accordance with manufacturer's instructions with a minimum two and one-half (2 1/2) inch concrete cover.

END OF SECTION

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Concrete masonry units (CMUs).
2. Face brick.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Miscellaneous masonry accessories.
9. Cavity-wall insulation.
10. Patching and repair of existing masonry for new and/or modified openings, including toothing-in of new CMU and brick.
11. All hoisting and scaffolding for completion of masonry work.
12. Masonry waste disposal.

B. Related Sections include the following:

1. Division 07 Section "Penetration Firestopping" for firestopping at openings in masonry walls.
2. Division 07 Section "Fire-Resistive Joint Systems" for fire-resistive joint systems at heads of masonry walls.
3. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

C. Products installed, but not furnished, under this Section include the following:

1. Steel lintels for unit masonry, furnished under Division 05 Section "Metal Fabrications."

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

A. Provide 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.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. 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.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
3. Control/Expansion Joints: Provide layout indicating locations of all control/expansion joints. Provide details for all conditions.

C. Samples for Initial Selection: For the following:

1. Face brick, in the form of straps of five or more bricks.
2. Colored mortar.
3. Weep holes/vents.

D. Samples for Verification: For each type and color of the following:

1. Face brick, in the form of straps of five or more bricks.
2. Colored-mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
3. Weep holes/vents.
4. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

A. 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 approved in writing.

B. Qualification Data: For testing agency.

C. 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.

a. Include material test reports substantiating compliance with requirements.

b. For bricks, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include material test report for efflorescence according to ASTM C 67.
d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

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.

D. 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 property specification.
2. Include test reports, per ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. 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.

F. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements in ACI 530.1.

G. Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot-weather requirements in ACI 530.1.

1.7 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. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

1. Mortar Test (Property Specification): For each mix required, per ASTM C 780.
2. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019.

E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings 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.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical wall area as directed by Architect.
2. Build mockups for typical exterior wall construction in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories.

    a. Include a sealant-filled joint at least 16 inches long in each exterior wall mockup.
    b. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
    c. Include metal studs, sheathing, air and vapor barrier, veneer anchors, flashing, and weep holes in exterior masonry-veneer wall mockup.

3. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
4. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
5. Protect accepted mockups from the elements with weather-resistant membrane.
6. Approval of mockups is for 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.

    a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

7. Demolish and remove mockups when directed by the Architect.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units 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 units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction 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.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and 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 from mortar splatter by spreading coverings 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.
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.

D. Cold-Weather Requirements: 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. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602/1.8C whenever the following conditions exist:

1. The ambient temperature falls below 40 deg F.
2. The temperature of masonry units is below 40 deg F.
3. Implement the following minimum procedures:

    a. The temperature of masonry units shall not be less than 20 deg F when laid in the masonry. Remove visible ice on masonry units prior to installation.
    b. Heat the mortar sand or mixing water to produce mortar temperatures between 40 deg F and 120 deg F at the time of mixing. Maintain mortar above 32 deg F until used in masonry.
    c. Use heat sources where ambient temperatures are between 20 deg F and 25 deg F on both sides of the masonry under construction. Install wind breaks when wind velocity is in excess of 15 mph.
    d. Where ambient temperature is below 20 deg F, provide an enclosure for the masonry under construction and use heat sources to maintain temperature above 32 deg F within the enclosure.
    e. Where mean daily temperatures are between 32 deg F and 40 deg F, protect completed masonry from rain and snow by covering with a weather resistive membrane for 24 hours after construction.
    f. Where mean daily temperatures are between 25 deg F and 32 deg F, completely cover completed masonry with a weather resistive membrane for 24 hours after construction.
    g. Where mean daily temperatures are between 20 deg F and 25 deg F, completely cover completed masonry with insulating blankets, or equal protection, for 24 hours after construction.
    h. Where mean daily temperatures are below 20 deg F, maintain masonry temperature above 32 deg F for 24 hours after construction by enclosure with supplementary heat, by electric blankets, by infrared heat lamps, or other acceptable methods.

4. Do not lay masonry units that are wet or frozen.
5. Remove masonry damaged by freezing conditions.
6. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg 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 602/1.8D, whenever the ambient air temperature exceeds the following:

1. 100 deg F, or 90 deg F with a wind velocity greater than 8 mph.
2. Implement hot weather protection in accordance with Article 2.1.2.1(d).
3. Do not spread mortar beds more than 4 feet ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 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 uses 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.

2.2 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions where indicated.
2. Provide factory fabricated bullnose units for outside corners.

B. Concrete Masonry Units: ASTM C 90.

1. Products: Subject to compliance with requirements, provide products by one of the following:

   a. A. Jandris & Sons.
   b. Nitterhouse Masonry Products, LLC.
   c. Westbrook Block, Inc.

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
3. Weight Classification: Lightweight.
4. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
5. Exposed Faces: Manufacturer’s standard color and texture.
6. Fire Rated Concrete Masonry: In accordance with test procedures set forth in ASTM E 199 or alternative methods as follows:

   a. U.L. Design Assemblies: Provide a U.L. Certificate for design of composite wall assembly for each hourly rating required.
   b. In accordance with the New York State Building Code:

1) Fire-resistance designs documented in approved sources.
2) Prescriptive designs of fire-resistant rated building elements as prescribed in Section 720.0.
3) Calculations in accordance with Section 721.0.
4) Engineering analysis based on a comparison of building element designs having fire resistance ratings as determined by test procedures set forth in ASTM E 119.

c. Fire rated wall construction includes reinforcement, facing or finish materials, load bearing and non-load bearing walls; and requirements for members framed into walls.

2.3 MASONRY LINTELS

A. General: Provide masonry lintels as indicated, complying with requirements below.

B. Masonry Lintels: Built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place lintels until cured.

2.4 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: ASTM C 216, Grade SW, Type FBS:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
5. Application: Use where brick is exposed, unless otherwise indicated.
6. Where shown to "match existing," provide face brick matching color range, texture, and size of existing adjacent brickwork.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. 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.

D. Masonry Cement: The use of masonry cement is not permitted.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

F. Colored Cement Product: Packaged blend made from portland cement and lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
2. Pigments shall not exceed 10 percent of portland cement by weight.
3. Products: Subject to compliance with requirements, provide one of the following:

a. Colored Portland Cement-Lime Mix:

1) Flamingo Brixment; Portland & Lime Blend.
2) Lafarge North America Inc.; Eaglebond.
3) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

4. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors for each masonry type indicated.

G. Aggregate for Grout: ASTM C 404.

H. 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. Products: Subject to compliance with requirements, provide one of the following:

a. Euclid Chemical Company (The); Accelguard 80.
b. GCP Applied Technologies; Morset.
c. Sonneborn Products, BASF; Trimix-NCA.

I. Water: Potable.

2.6 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Limit cementitious materials in mortar to portland cement and lime.
3. 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.

B. Mortar Mixes: At Contractor’s option, provide job-mixed mortar or preblended dry mortar mix. Provide colors required for each application indicated.

C. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

1. Basis of Design Product: Subject to compliance with requirements, provide the following, or equal:

a. Spec Mix; Portland Lime & Sand and Portland Lime and Sand/Color.

D. Pigmented Mortar: Use colored cement product.

1. Application: Use pigmented mortar for exposed mortar joints with the following units:

a. Face brick.

E. Mortar Types for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated:

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type M or S.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.
4. For exterior masonry veneer, use Type N.

F. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

a. Use fine grout for 6 inch thick concrete masonry wythes.
b. Use course grout for 8-inch thick or greater concrete masonry wythes.

2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

2.7 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

2.8 MASONRY JOINT REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter (9 gauge).
4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter (9 gauge).
5. Wire Size for Veneer Ties: W2.8 or 0.188-inch diameter (3/16-inch).
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

B. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Hohmann & Barnard, Inc.; #220 Ladder Mesh.
b. Wire-Bond; Series 200 Core Clear Ladder Type.

2.9 TIES AND ANCHORS, GENERAL

A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with the following:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.

1. Where wythes do not align, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
2. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire.

2.10 ADJUSTABLE MASONRY-VENEER ANCHORS FOR CONNECTING MASONRY TO METAL STUDS

A. 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 metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Screw-Attached, Masonry-Veneer Anchors (Face Brick Veneer): Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with projecting tabs having holes for inserting vertical legs of wire tie formed to fit anchor section.

a. Products: Subject to compliance with requirements, provide one of the following:

1) Heckmann Building Products Inc.; 213 with 282.
2) Hohmann & Barnard, Inc.; HB-213.
3) Wire-Bond; RJ-711.

b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 3 inches wide; with projecting tabs of depth required to suit rigid insulation, having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.
c. Fabricate sheet metal anchor sections and other sheet metal parts from 14 gauge, steel sheet, galvanized after fabrication.

d. Wire Ties: Pintle type wire ties fabricated from 0.188-inch- diameter (3/16-inch), hot-dip galvanized steel wire.

3. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

a. Products: Subject to compliance with requirements, provide one of the following:

1) ITW Buildex; Teks Maxiseal with Climaseal finish.
2) Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.

2.11 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Anchor Bolts: Headed 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/A 153M, Class C; of dimensions indicated.

C. Partition Top anchors: 12 gauge metal channel with anchor holes sized to suit masonry partition, including neoprene sponge to allow for vertical expansion and contraction. Fabricate from steel, hot-dip galvanized after fabrication.

1. Product: Subject to compliance with requirements, provide the following, or equal:

a. Hohmann & Barnard, Inc.; PTA #422.

D. Postinstalled Anchors: Provide torque-controlled expansion 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: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).

2.12 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with Division 07 Section "Sheet Metal Flashing and Trim" and as follows:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Heckmann Building Products Inc.; #1007 Hemmed Drip Edge Flashing.
b. Hohmann & Barnard, Inc.; Standard Drip Plate DP.
c. Wire-Bond; Drip Edge.

2. Stainless Steel: ASTM A 240/A 240M, Type 304, 26 gauge.
3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing. Provide preformed inside and outside corners to match size and gauge of drip edge flashing.

4. Metal Drip Edges: Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed 3/8-inch.

B. Metal Flashing (Base of Wall): Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with Division 07 Section "Sheet Metal Flashing and Trim" and as follows:

1. Basis of Design Product: Subject to compliance with requirements, provide the following, or equal:

a. Hohmann & Barnard, Inc.; Flat Drip Plate DP.

2. Stainless Steel: ASTM A 240/A 240M, Type 304, 26 gauge.
3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing. Provide preformed inside and outside corners to match size and gauge of drip edge flashing.
4. Metal Drip Edges: Extend at least 3 inches into wall and flush end with wall, with outer edge bent 180 degrees and hemmed 3/8-inch.

C. Flexible Flashing: For flashing not exposed to the exterior, use the following, unless otherwise indicated:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle Coatings & Waterproofing Inc; CCW-705-TWF Thru-Wall Flashing.
b. GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
c. Henry; Blueskin TWF.
d. Tremco Incorporated; ExoAir TWF.

2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 40 mils.

D. Solder and Sealants for Sheet Metal Flashings:

1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

F. Termination Bars for Flexible Flashing: Stainless-steel sheet 0.019 inch by 1-1/2 inches with a 3/8 inch sealant flange at top.

2.13 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.

1. Control Joints and Brick Expansion Joints: Provide compressible filler, 3/8-inch thick and 3 inches wide.

a. Products: Subject to compliance with requirements, provide one of the following, or equal:

1) Hohmann & Barnard, Inc.; NS Closed Cell Neoprene Sponge.

2) Wire-Bond; #3300 Expansion Joint.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Preformed Control-Joint Gaskets: Made from 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.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Hohmann & Barnard, Inc.; #VS Series – PVC Control Joint.
b. Wire-Bond; PVC Control Joint.

D. Weep/Vent Products: Use the following:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
2. Products: Subject to compliance with requirements, provide one of the following:

a. Advanced Building Products Inc.; Mortar Maze Cell Vent.
b. Heckmann Building Products, Inc.; No. 85 Cell Vent.
c. Hohmann & Barnard, Inc; QV Quadro-Vent.
d. Wire-Bond; Cell Vent.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Advanced Building Products Inc.; Mortar Break DT.
b. CavClear/Archovations, Inc.; CavClear Masonry Mat.
c. Hohmann & Barnard, Inc.; Mortar Trap.
d. Keene Building Products; KeeneStone.
e. Mortar Net USA, Ltd.; Mortar Net.

2. Configuration: Provide one of the following:

a. Strips, full-depth of cavity and 10 inches wide, with dovetail shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.
b. Strips, not less than 3/4 inch thick and 10 inches wide for full-depth of cavity, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.

F. Grout Screen: Fabricated from monofilament polypropylene mesh to prevent grout falling through; without interfering with mortar bond.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Advanced Building Products Inc.; Grout Catch.
b. Heckman Building Products, Inc.; Grout Stop.
c. Hohmann & Barnard, Inc.; MGS.
d. Wire-Bond; Grout Stop 3612.

G. 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 0.148-inch (9 gauge) steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
b. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
c. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.14 CAVITY-WALL INSULATION

A. Extruded-Polystyrene Board Insulation with Increased R-Value: ASTM C 578, Type IV, but with an aged thermal resistance (R-value) for 1-inch thickness of 5.6 deg F x h x sq. ft./Btu at 75 deg F at 5 years; closed-cell product with a carbon-black filler and extruded with an integral skin; with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Chemical Company; CavityMate Ultra.
b. Owens Corning; High R CW Plus.

2.15 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Diedrich Technologies, Inc.
b. ProSoCo, Inc.

B. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental 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.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. 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.

5. 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.
6. 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.
7. 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.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in the following bond pattern(s); do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. Running bond.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; 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 construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

G. 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.

H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

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 07 Section "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow brick and concrete masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together using the following method:

1. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

a. Reinforcement above is in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. 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.

D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.

3.8 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to metal stud wall framing with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing with two metal fasteners of type indicated, in sufficient length to extend through metal stud up to the third thread.
2. Embed pintle tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of rigid insulation or sheathing. Use ties of sufficient length to extend 2 inches into the back of the masonry veneer, and no closer than 1 inch to the exterior face.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.

3.9 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
2. Install control joints in interior concrete masonry partitions where indicated, and as follows. During wall layout, verify locations of all control joints with Architect.

    a. Spacing of control joints in straight walls not to exceed 20 feet horizontally.
    b. Install control joints at intersections of walls and column enclosures.

C. Form expansion joints in brick made from clay or shale as follows:

1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."
3. Spacing in brick veneer not to exceed 24 feet.
4. Spacing in concrete masonry veneer not to exceed 18 feet.

3.10 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.11 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of air and vapor barrier at least 16 inches or 6 inches above cavity drainage material, whichever is greater.
3. At lintels and shelf angles, extend flashing a minimum of 8 inches into masonry at each end. At heads and sills, extend flashing 8 inches at ends and turn up not less than 2 inches to form end dams.
4. Install termination bar at top edge of flashing and apply manufacturer’s rubberized asphalt based termination mastic continuously at the top edge of the termination bar.
5. At heads and sills, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
6. Install metal drip edges beneath flexible flashing at exterior face of wall at all openings, at base of cavity walls, and all horizontal relieving angles. Adhere flexible flashing to top of metal drip edge. Install prefabricated inside and outside corners as required at inside and outside corners of wall conditions.

    a. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing, at the top of wall in the first exposed course of veneer immediately below the roof fascia, where indicated at window heads, and as follows:

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches o.c., unless otherwise indicated.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

3.12 REINFORCED UNIT MASONRY INSTALLATION

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.

C. Grouting: 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.

D. 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.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to the New York State Building Code.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

C. 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.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for compressive strength.

F. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

G. Weep Vents: Test function of weep vents located at base of wall, heads of openings, and relieving angle locations. Verify that water passes through all weeps.

1. Perform testing of weep vents only upon completion of entire wall construction.

3.14 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

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 set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.15 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042000

SECTION 051204 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including the General and Supplementary Conditions, apply to the work specified in this Section.

1.02 SCOPE OF WORK

A. The work under this Section consists of furnishing all labor, materials and equipment required to complete the structural steel as shown on the Drawings and/or as herein specified.

B. Work Includes

1. Beams, Girders, Angles and Columns
2. Hangers, Bracing, and Girts
3. Base Plates, Bearing Plates, and Leveling Plates
4. Anchor Bolts
5. Connections
6. Masonry Anchors
7. Roof Drain Angle Frames

1.03 RELATED WORK

A. Section 05 30 04 - Metal Decking

1.04 QUALITY ASSURANCE

A. Standards

1. Quality control, fabrication and erection shall be in accordance with the 2010 AISC Specification for the "Specification for Structural Steel Buildings" and the 2010 Edition of AISC "Code of Standard Practice for Steel Buildings and Bridges", except as amended herein.

2. Welding shall be in accordance with the AWS Structural Welding Code as modified by AISC Section 1.17 "Welds".

3. Surface preparation for structural steel painting shall conform with "Steel Structures Paint Manual, Vol. 2, Systems and Specifications".

B. Qualified Welders

1. All welding, shop and field, shall be done by certified welders.

C. Testing

1. The Owner may retain and pay for an approved testing laboratory to inspect field welds, bolting, decking, and erection.

2. The cost of retesting shall be paid by the Contractor.

1.05 COORDINATION AND MEASUREMENTS

A. Prior to submitting Shop Drawings, the Contractor shall field verify all dimensions and elevations to assure proper fabrication and erection.

B. The work of this Section shall be closely coordinated with work of other trades.

1.06 SUBMITTALS

A. Shop Drawings

1. The Contractor shall submit two (2) prints and one (1) reproducible of Shop and Erection Drawings showing all structural steel members and connections including anchor bolts to the Engineer for review. Any work begun before drawings are reviewed by the Engineer will be at the Contractor's own risk.

2. Erection Drawings shall clearly show the following: sizes, locations and elevations of all members; grades of steel; standard connections per AISC Manual fully identified for all beam support points; details of non-standard and eccentric connections indicated on Structural Drawings; notes on connectors and fasteners; shop painting instruction, erection notes, and field painting instruction.

3. Detail Shop Drawings showing all members shall be submitted for review. Such drawings shall show size, length, connections and connection locations.

4. Acceptance will be for size and arrangement for principal and auxiliary members. Any error in dimensions will be the responsibility of the Contractor.

5. The following paragraph in Section 4 Shop and Erection Drawings of the AISC "Code of Standard Practice for Steel Buildings and Bridges" shall be deleted:

> "4.2.1 Approval by the owner of shop drawings prepared by the fabricator indicates that the fabricator has correctly interpreted the contract requirements. 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. Approval does not relieve the fabricator of the responsibility for accuracy of detail dimensions on shop drawings, nor the general fit-up of parts to be assembled in the field."

B. Certificates

1. Mill certificates covering any portion of the steel shall be furnished if requested by the Engineer.

2. AWS welding certificates for shop or field welders shall be furnished if requested by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All structural steel wide flange shapes shall conform to the requirements of ASTM A572, Grade 50 or ASTM A992. Plates, channels, angles, and other miscellaneous steel shall conform to the requirements of ASTM A36.

B. All structural steel tubing shall conform to requirements of ASTM A500, Grade "B", manufactured by seamless or continuous weld process with rounded corners and outside sizes shown.

C. All structural steel pipe shall conform to requirements of ASTM A53.

D. Welding electrode types for A36, A572, and A992 steel shall conform to AISC Specifications using E-70XX electrodes.

E. Shop paint shall be Tnemec Co. No. 88HS-559 gray metal modified alkyd primer, or approved equal.

F. Bolts shall conform to high strength A325.

G. Anchor bolts and rods shall conform to ASTM F1554, Grade 36. Use Grade 55 where specifically noted on Documents.

PART 3 - EXECUTION

3.01 FABRICATION AND ERECTION

A. Connections of structural steel members, not otherwise noted or shown, shall be framed using connections which will develop the full strength of the beam. Design of end connections shall be in accordance with the AISC "Manual of Steel Construction". Field connections may be bolted using three-quarter (3/4") inch bolts, except where noted welded. A minimum of two (2) bolts per member connection is required.

B. Connections shall be consistent with "Type 2" construction as described in the AISC Specifications, unless otherwise indicated on the Structural Drawings.

C. All column ends scheduled to receive cap and base plates shall be milled or sawn to ensure full bearing. All surfaces to be welded shall be free from loose scale, rust, grease, paint or other foreign

material, except that mill scale which resists vigorous brushing may remain. Joint surfaces shall be free from fins or tears.

D. Fillet weld shall be one-quarter (1/4") inch minimum, unless otherwise noted.

E. Technique of welding employed, the appearance and quality of welds and the methods of correcting defective work shall conform to American Welding Society's latest edition of "Structural Welding Code". All welding shall be by AWS certified welders.

F. Provide one-half (1/2") inch diameter bolts at two feet six inches (2'-6") on center, staggered where the attachment of wood blocking and/or nailers are indicated on the Drawings.

G. Provide flexible masonry anchors as required in Division 4.

H. The Contractor shall accept full responsibility for design strength, safety and adequacy of all temporary bracing and sequencing of structural steel erection to brace the structure. Provide all temporary braces, guys, connections and work platforms required to safely resist all loads to which the structure may be subjected, including storms.

I. The Contractor shall guy, plumb, and align framing in accordance with limits defined in the "Code of Standard Practice" of AISC.

J. Any corrections required in field to make members fit shall be brought to the attention of the Engineer for approval.

K. Provide angle frames for all openings in steel roof deck larger than twelve (12) inches.

L. Provide angle frame to support all roof drain sump pans.

3.02 PAINTING

A. All structural steel not concrete encased or to which spray fireproofing will not be applied shall receive one (1) coat of shop paint applied only after all fabrication is completed and as specified by the manufacturer's label on the containers. Prior to painting, steel shall be thoroughly cleaned of dirt, mud, loose rust or other foreign matter which may have accumulated. Shop coat dry film thickness shall be two (2.0) mils minimum.

B. Do not shop paint areas adjacent [two (2") inches either side] to field welds.

C. Dried shop paint shall be free of abrasions, runs, sags, cracking, delaminations, skipped, and missed areas. All deficiencies shall be corrected at no additional cost to the Owner.

END OF SECTION

SECTION 05300 - METAL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including the General and Supplementary Conditions, apply to the work specified in this Section.

1.2 SCOPE OF WORK

A. The work under this Section shall consist of furnishing all labor, material, accessories, tools, transportation, etc., necessary to furnish, fabricate and erect all the metal decking required by the Drawings and/or herein specified, generally as follows:

1. All metal roof decking, including roof drain pans and closure accessories.

1.3 RELATED WORK

A. Section 051204 - Structural Steel

1.4 QUALITY ASSURANCE

A. Applicable Codes

1. All work shall conform to the following codes (latest edition) except as modified in the Specifications.
   a. Steel Deck Institute
   b. American Iron and Steel Institute
   c. American Institute for Steel Construction "Design, Fabrication and Erection of Structural Steel for Buildings".

1.5 SUBMITTALS

A. Shop Drawings

1. Submit two (2) prints and one (1) reproducible showing all dimensions, details, layout, accessories and physical properties necessary for a complete installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Roof Deck

1. Metal roof deck shall be 1 1/2 inch deep, 22 gauge galvanized, Type B steel deck, wide rib, manufactured by a member firm of the Steel Deck Institute. Deck shall be made of steel conforming to ASTM A653, Grade 33, coating class G60, having a minimum yield strength of

33,000 psi. with minimum physical properties of (I = 0.169 in.|4|) and (S = 0.198 in.|3|).

2. Roof drain pans shall be flat 14 gauge galvanized steel.

3. All steel deck and accessories shall be thoroughly cleaned of all grease, oil and dirt after fabrication. Finish shall be galvanized in conformance to ASTM A653, coating Class G60.

PART 3 - EXECUTION

3.1 DECK PROTECTION

A. Deck shall be protected during transit to prevent contamination from road salts.

B. Reasonable care and protection shall be given to all steel deck units during handling. If steel deck units are to be stored prior to being placed, they shall not be in contact with the ground and shall be protected from the weather.

3.2 INSTALLATION OF METAL ROOF DECK

A. Steel deck units shall be erected and adjusted to final position with proper end bearing, and side laps in accordance with manufacturer's specifications and approved shop drawings.

B. Secure deck units in place with five-eighths (5/8") inch diameter fusion welds without causing blow holes. Welds shall not exceed twelve (12") inches on center at all intermediate supports and six (6") inches at end laps. Six (6") inch ribs of each unit shall be interlocked with the adjacent unit and side laps shall be fastened with self-tapping screws at mid-span. Secure steel plate accessories to deck with self-tapping screws or blind rivets. Sides of sheet bearing on perimeter steel supports shall be welded to supporting steel at twelve (12") inches on center.

C. Field cutting of deck units for openings shall be done in workmanlike fashion with shears, saw or other approved equipment. All openings cut in deck units for pipe sleeves, ducts, etc., shall be reinforced as shown on the Drawings. Openings exceeding six (6") inches in width shall not be cut in deck units unless shown on structural drawings or approved by the Structural Engineer.

D. Any warped or twisted panels will not be accepted or approved.

E. Deck shall be continuous over three (3) or more supports and shall have end laps of at least two (2") inches over supports. Side laps shall be lapped a minimum of one-half (1/2) corrugation.

F. All welds and adjacent surfaces on which protective coating was damaged shall be cleaned and painted within twenty-four (24) hours after welding is complete. Paint shall be manufacturer's standard product, subject to the Engineer's approval.

END OF SECTION

SECTION 055000 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.

B. Related Sections include the following:

1. Division 04 Section "Unit Masonry" for installing loose lintels into unit masonry.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.4 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

C. Galvanize loose steel lintels.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.6 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Placement: Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wood blocking, nailers, and plywood associated with roofing.
2. Wood blocking in partition framing, including wood blocking for Owner furnished millwork and equipment.
3. Plywood backing panels.

B. Related Sections include the following:

1. Division 08 Section "Door Hardware" for door hardware and additional installation requirements.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Fire-retardant-treated wood.

2. Power-driven fasteners.
3. Powder-actuated fasteners.
4. Expansion anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 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.

B. Plywood: DOC PS 1.

1. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
2. Factory mark panels to indicate compliance with applicable standard.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

E. Application: Treat the following:

1. Concealed blocking in wall framing and window opening framing.
2. Plywood backing panels.

F. Manufacturers: Subject to compliance with requirements, provide products by one the following:

1. Dricon.
2. Hoover Treated Wood Products.
3. Koppers Performance Chemicals.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Furring.

B. For items of dimension lumber size, provide Construction or No. 2 lumber with 15 percent maximum moisture content and the following species:

1. Hem-fir (north); NLGA.

C. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. Application: Provide kiln dried lumber in the following locations:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, fire retardant treated, or in area of high relative humidity, provide G185 galvanized steel fasteners, or fasteners with hot-dipped galvanized after fabrication.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts: ASME B18.2.1.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

G. 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.

1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

C. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.

D. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

E. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

F. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 FIRE-RETARDANT-TREATED (FRT) MATERIALS INSTALLATION

A. Cutting to length, drilling holes, joining cuts and light sanding are permissible. It is not necessary to field treat cut ends to maintain flame spread rating.

1. Ripping, milling, and surfacing of FRT lumber is not permitted.
2. FRT plywood can be cut in either direction without loss of fire protection.

3.4 PROTECTION

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Plastic-laminate-clad cabinets.
2. Plastic-laminate-clad soffits.
3. Wood soffit panels.
4. Suspended plastic-laminate clad wood trellis.
5. Wood handrails for installation at existing stairs.
6. Banquettes.

B. Section also includes:

1. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork, unless concealed within other construction before cabinet installation.

C. Related Sections include the following:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, fire retardant treated plywood, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
2. Division 09 Section “Painting” for field finishing standing and running wood trim.
3. Division 12 Section “Simulated Stone Countertops” for solid-surface countertops installed with custom interior architectural woodwork (separate contract).

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

B. Exposed Exterior Surfaces of Cabinets: All exterior surfaces exposed to view as follows:

1. All surfaces visible when door and drawers are closed, including knee spaces.
2. Underside of cabinet bottoms over 42 inches above finish floor, including cabinet bottoms behind light valances and the bottom edge of light valances.
3. Cabinet tops under 80 inches above finish floor, or if over 80 inches and visible from an upper level.
4. Visible front edges of stretchers, ends, divisions, tops, bottoms, shelves and nailers.
5. Sloping tops of cabinets that are visible.

C. Exposed Interior Surfaces of Cabinets: All interior surfaces exposed to view in open casework or behind glass doors as follows:

1. Shelves, including edgebanding.
2. Divisions and partitions.
3. Interior face of ends (sides), backs, and bottoms (including pull-outs).
4. Interior surfaces of cabinet top members 36 inches or more above finished floor.
5. Interior face of door and applied drawer fronts.

D. Semi-exposed Surfaces of Cabinets: Interior surfaces exposed to view only when doors or drawers are opened as follows:

1. Shelves, including edgebanding.
2. Divisions and partitions.
3. Interior face of ends (sides), backs, and bottoms (including pull-outs).
4. Interior surfaces of cabinet top members 36 inches or more above finished floor.
5. Drawer sides, sub-fronts, backs, and bottoms.
6. Underside of cabinet bottoms between 24 and 42 inches above finished floor.
7. Security and dust panels or drawer stretchers.

E. Concealed Surfaces of Cabinets: Exterior or interior surfaces that are covered or not normally exposed to view, as follows:

1. Toe space, unless otherwise specified.
2. Sleepers, stretchers, and solid sub-tops.
3. Underside of cabinet bottoms less than 24 inches above finished floor.
4. Flat tops of cabinets 80 inches or more above finished floor, except if visible from an upper level.
5. The three non-visible sides of adjustable shelves.
6. The underside of countertops, knee spaces, and drawer aprons.
7. The faces of cabinet ends of adjoining units that butt together.

1.4 SUBMITTALS

A. Product Data: For high-pressure decorative laminate, adhesive for bonding plastic laminate, cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Indicate AWI/QCP Number assigned to this Project on all pages of shop drawings.
2. Show details full size.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for plumbing fixtures and faucets installed in architectural woodwork.

C. Samples for Initial Selection:

1. Plastic laminates.
2. PVC edge material.

D. Samples for Verification:

1. Lumber for transparent finish, not less than 5 inches wide by 24 inches long, for each species and cut, finished on 1 side and 1 edge.
2. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish.
3. Corner pieces as follows:

    a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.

4. Exposed cabinet hardware and accessories, one unit for each type.
5. Full size cabinet samples, including all mounting hardware and fasteners.

    a. One full size base cabinet with drawer and all hardware.
    b. One full size upper cabinet.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

G. Qualification Data: For Fabricator.

H. Delegated-Design Submittal: For design of suspended wood ceiling system, seismic restraints and attachment devices.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.

B. Installer Qualifications: Fabricator of products, or installer approved by fabricator and a certified participant in AWI's Quality Certification Program.

C. Professional Structural Engineer Qualifications: A professional structural engineer who is legally qualified to practice in the State of New York and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations that are similar to those indicated for this Project in material, design, and extent.

D. Accessibility: Comply with applicable provisions in the 2010 ADA Standards and ICC/ANSI A117.1.

E. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Contractor shall register the work of this Section with the AWI Quality Certification Program.
2. Provide AWI Quality Certification labels and certificates indicating that interior architectural woodwork, including installation, complies with requirements of grades specified.
3. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of typical plastic-laminate-clad cabinets, including the following:

a. A minimum of two base cabinets, with countertop.
b. One upper cabinet.
c. One tall cabinet.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," and licensed in the State of New York to design suspension system, seismic restraints, and attachment devices for suspended trellis ceiling.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 84 for Class C materials.
2. Smoke-Developed Index: 450 or less.

2.2 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
3. Particleboard: ANSI A208.1, Grade M-2.
4. Softwood Plywood: DOC PS 1.

C. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Basis of Design Products (**PL-01,02,03**): Subject to compliance with requirements, provide **Wilsonart** in colors as indicated on the Finish Legend or comparable product by one of the following:

a. Formica.
b. Pionite.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:

1. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.

C. Wire Pulls:

1. Basis of Design Product: Subject to compliance with requirements, provide the following:

a. Top Knobs; Square Bar Pull M1158.

2. Finish: Brushed satin nickel.
3. Length: 5-1/16- inches center to center.

D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf brackets, B04081.

E. Shelf Rests: BHMA A156.9, B04013; plastic, two-pin type with shelf hold-down clip.

F. Catches: Magnetic catches, BHMA A156.9, B03141.

G. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches high and 24 inches wide.
3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches high or 24 inches wide.

H. Locks: Furnish locks on all cabinet doors and drawers, keyed alike per room, with one master key.

1. Door Locks: BHMA A156.11, E07121.
2. Drawer Locks: BHMA A156.11, E07041.

I. Grommets for Cable Passage through Countertops: 3-1/2-inch OD, aluminum grommet and matching cap with slot for wire passage, and radiused brush.

1. Basis of Design Product: Subject to compliance with requirements, provide the following:

a. Doug Mockett & Company, Inc.; ABG3-94.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

D. Adhesive for Bonding Plastic Laminate: Contact cement.

E. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Multipurpose Construction Adhesives: 70 g/L.
3. Contact Adhesive: 250 g/L.

2.5 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.

D. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.6 PLASTIC-LAMINATE-CLAD CABINETS

A. Grade: Custom.

B. Type of Construction: Frameless.

C. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

D. Cabinet Fabrication: 3/4-inch particleboard.

E. Shelving: Fabricated from particleboard with surfaces indicated, in the following thicknesses:

1. Shelving up to 36- inches wide: 1-inch thick.
2. Shelving 36- inches to 48- inches wide: 1-1/4-inch thick.

F. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Vertical Surfaces, Base and Tall Cabinets: Grade HGS.
3. Vertical Surfaces, Upper Cabinets: Grade VGS.
4. Edges: PVC edge banding, 0.12 inch (3 mm) thick, in color selected by Architect from manufacturer’s full range.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

G. Materials for Semiexposed Surfaces:

1. Horizontal Surfaces, Shelves: Grade HGS.
2. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, in color as selected by Architect from manufacturer's full range.
b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS for vertical surfaces with VGS specified for exposed surfaces.
c. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade HGS for vertical surfaces with HGS specified for exposed surfaces.

3. Drawer Sides and Backs: Thermoset decorative panels.
4. Drawer Bottoms: Thermoset decorative panels.

H. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

2.7 SUSPENDED TRELLIS CEILINGS

A. Grade: Premium.

B. Slotted Channel Framing System: Fabricated from 12-gauge cold formed steel, hot-dipped galvanized finish.

1. Product: Subject to compliance with requirements, provide the following:

a. UNISTRUT Channel Framing System; P1000.

2. Channels: Minimum pull out resistance of 1,000 lbs. when load is applied over a 3/8-inch long section.

a. Channel profile: 1-5/8" x 1-5/8".

3. Fasteners: Provide stainless steel fasteners as required for the assembly.
4. Finish: Painted black to comply with Division 09 Section "Painting."

2.8 WOOD HANDRAILS (FIELD FINISHED)

A. Interior Handrails: White maple, plain sliced, of size and shape indicated.

B. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets for attaching to other work. Furnish inserts and other anchorage devices for connecting to gypsum board or masonry work.
1.
2. Wall Brackets: Provide minimum clearance of 1-1/2- inches from bottom of handrail to top of horizontal projection of the bracket, and minimum 1-1/2- inches clear from wall to edge of handrail.

a. Product: Subject to compliance with requirements, provide the following, or equal:

1) The Wagner Companies; Style D Handrail Bracket, No. 4591, malleable iron.

2.9 BANQUETTES

A. Banquettes: Constructed with multi-ply exterior grade hardwood plywood frames, flame retardant sheet webbing suspension system and flame retardant foams. Frames assembled with pneumatic staples and glued, screwed and/or reinforced at all potential stress points. Custom fabricate banquettes to configurations indicated.

B. Fire-Test-Response Characteristics of Upholstered Seating:

1. Fabric: Class 1 according to DOC CS 191-1953 or 16 CFR 1610, tested according to California Technical Bulletin 117.
2. Padding: Comply with California Technical Bulletin 117.
3. Full-Scale Fire Test: Comply with California Technical Bulletin 133.

C. Fabrics, General: Performance requirements are indicated for basis of design products for the purpose of comparing equal or comparable products by listed manufacturers.

1. Basis of Design Products (**FAB-001,002,003**): Subject to compliance with requirements, provide products indicated on Finish Material List.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.

1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.

H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

I. Refer to Division 09 Section “Painting” for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Perimeter insulation under slabs-on-grade.
2. Perimeter wall insulation (supporting backfill).
3. Thermal insulation.
4. Sound attenuation insulation.
5. Fire safing insulation.
6. Vapor retarders.

B. Related Sections include the following:

1. Division 04 Section "Unit Masonry" for insulation installed in cavity walls.
2. Division 07 Section "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing" for insulation specified as part of roofing construction.
3. Division 09 Section "Gypsum Board Assemblies" for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: Full-size units for each type of exposed insulation indicated.

C. Low-emitting product certification.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

C. Indoor Air Quality Requirements: The following practices shall be implemented in accordance with Division 01 Section “Indoor Air Quality Requirements.”

1. Insulations are to be stored per manufacturer’s recommendations for allowable temperature and humidity range. Insulations shall not be allowed to become damp.
2. Where feasible, fiberglass, mineral wool, and other fibrous insulations shall be stored separately from materials which have high short-term emissions. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.
3. Where feasible, exposed fiberglass or mineral wool insulations shall not be stored in occupied spaces, near HVAC diffusers (supply or return), or near fresh air intakes.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation (Perimeter Wall): ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Chemical Company; Styrofoam Brand Square Edge.
b. GreenGuard; XPS Type IV.
c. Owens Corning; Foamular 250.

2. Type IV, 1.60 lb/cu. ft.
3. Thermal Resistance: 5 year aged R-values of 5.4 and 5.0 minimum, at 40 deg. F and 75 deg. F respectively.
4. Compressive Strength: ASTM D1621, 25 psi.
5. Water absorption: ASTM C272, 0.1% by volume maximum.

B. Extruded-Polystyrene Board Insulation (Under Slab): ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Chemical Company; Styrofoam Highload 40.
b. GreenGuard; XPS Type VI.
c. Owens Corning; Foamular 400.

2. Type VI, 1.80 lb/cu. ft.
3. Thermal Resistance: 5 year aged R-values of 5.4 and 5.0 minimum, at 40 deg. F and 75 deg. F respectively.
4. Compressive Strength: ASTM D1621, 40 psi.
5. Water absorption: ASTM C272, 0.1% by volume maximum.

2.2 GLASS-FIBER BLANKET INSULATION (THERMAL)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation; CertaPro AcoustaTherm Batts.
2. Johns Manville; Unfaced.
3. Knauf; EcoBatt.
4. Owens Corning; Ecotouch Thermal Batt Insulation.

B. Thermal Insulation: Provide insulating materials as follows:

1. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

a. Provide thickness indicated or as required to fill depth of partition.

2.3 GLASS-FIBER BLANKET INSULATION (SOUND ATTENUATION)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation; CertaPro AcoustaTherm Batts.
2. Johns Manville; Sound Control Batts.
3. Knauf; EcoBatt.
4. Owens Corning; Sound Attenuation Batt Insulation (SAB).

B. Sound Attenuation Insulation: Provide insulating materials as follows:

1. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

a. Thickness: As indicated, not less than 3-1/2 inches.

2.4 MINERAL-WOOL-BOARD INSULATION (FIRE SAFING)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Johns Manville; MinWool Safing.
2. Roxul Inc.; Roxul SAFE.
3. Thermafiber; Safing Insulation.

B. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; water repellant rigid insulation board with a rigid upper surface, with maximum flame-spread and smoke-developed indexes of zero, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Nominal density of 4.5 lb/cu. ft. minimum.

2.5 VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.

1. If not otherwise indicated, extend insulation a minimum of 48 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

C. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.

D. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

C. Install unfaced, slag-wool-fiber/rock-wool-fiber blanket insulation in penetrations in all non-fire rated horizontal floor/ceiling assemblies, including edge of slab conditions indicated. Fill annular space of penetration to resist the free passage of flame and the products of combustion.

3.6 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

F. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.7 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072729 – WATER-RESISTIVE AIR-BARRIER MEMBRANES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes vapor-permeable air-barrier membranes.

B. Related Requirements:

1. Division 09 Section "Gypsum Board Assemblies" for exterior gypsum wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 REFERENCES

A. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

2. Submit documentation from an approved independent testing laboratory certifying the membrane meets ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers.

B. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

D. Warranty: Special warranty included in this Section.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Provide list of at least three (3) projects completed by the Installer within the past five (5) years of similar scope and complexity to this Project.
2. Installer must show evidence of adequate equipment and trained field personnel to successfully complete project.

B. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly as directed by Architect, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

    a. Coordinate construction of mockups to permit inspection by Owner's testing agency of air barrier before external insulation and cladding are installed.
    b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
    c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.11 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by air-barrier system manufacturer agreeing to repair or replace self-adhered water-resistive vapor permeable air-barrier system that does not comply with requirements or that does not remain watertight within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

B. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.

C. Fire Performance Characteristics: Provide water-resistive barrier meeting the following fire-test characteristics.

1. Surface-Burning Characteristics: ASTM E 84.

a. Flame spread index: 25 or less
b. Smoke developed index: 450 or less

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

2.3 VAPOR-PERMEABLE, AIR-BARRIER MEMBRANE

A. Vapor-Permeable Non-Bituminous Sheet: Self-adhering, water-resistive, air barrier sheet membrane.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cosella-Dörken Products, Inc.; Delta-Vent SA.
b. GCP Applied Technologies; Perm-A-Barrier VPS.
c. Henry Company; Blueskin VP 160.
d. VaproShield LLC; WrapShield SA.

2. Physical and Performance Properties:

a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
b. Vapor Permeance: Minimum 15 perms; ASTM E 96/E 96M.

3. Research/Evaluation Reports:

a. Product must be approved for use in Type II construction in accordance with the New York State Building Code (IBC) Section 2603.5 for use with foam plastic insulation and tested in accordance with and comply with the acceptance criteria of NFPA 285.

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Primer: As required and as recommended for substrate by air-barrier material manufacturer.

C. Joint Reinforcing Fabric: Air-barrier manufacturer's nonwoven, reinforcement fabric.

D. Joint Reinforcing Strip: Air-barrier manufacturer's self-adhering glass-fiber-mesh tape.

E. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

F. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

G. Elastomeric Flashing Sheet: ASTM D 2000, minimum 50- to 65-mil- thick, cured sheet neoprene with manufacturer-recommended contact adhesives and lap sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

E. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of air-barrier coating material at joints. Tape joints with joint reinforcing after first layer is dry. Apply a second layer of air-barrier coating material over joint reinforcing.

3.4 TRANSITION STRIP INSTALLATION

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier coating material on same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

1. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 VERTICAL APPLICATIONS

A. For vertical applications, align sheets with an ‘inside’ or ‘outside’ corner to avoid wrinkles and miss-alignment of subsequent applications.

B. Measure and pre-cut into manageable sized self-adhered sheets to suit the application conditions.

C. Hang sheets over wall and extend down to lowest point of wall. Allow for excess material at bottom of wall to accommodate tie-ins and connections to adjacent surfaces.

3.6 BATTENS AND VENTILATION STRIPS FOR RAIN SCREEN CLADDING SYSTEMS

A. Provide and install specified battens and ventilation strips under cladding systems.

B. Install horizontal starter strip or vent strip at base of wall, vertical battens and top vent strip, secure into solid backing ready for installation of cladding system.

C. Coordinate spacing of battens and vent strips to accommodate cladding system.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections shall include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air-barrier system has been provided.

3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Strips and transition strips have been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Tests:

1. Quantitative Air-Leakage Testing: Air-barrier assemblies will be tested for air leakage according to ASTM E 783.
2. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 30 lbf/sq. in. according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.

D. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.8 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than [30] [60] <Insert number> days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072729

SECTION 074213.53 – LINEAR METAL SOFFITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes strip, linear metal pans and suspension systems for exterior soffits.

B. Related Sections:

1. Division 09 Section “Gypsum Board Assemblies” for metal support framing for exterior ceilings and soffits.
2. Division 09 Section "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
3. Division 26 Sections for light fixtures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Performance Data: For installed products indicated to comply with design loads and other criteria, include structural analysis and other analytical data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

C. Samples for Initial Selection: For components with factory-applied color and other decorative finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:

1. Linear Metal Pan: Set of 12-inch- long Samples of each type and color and a 12-inch- long spliced section.
2. Suspension System Members: 12-inch- long Sample of each type.
3. Exposed Molding and Trim: Set of 12-inch- long Samples of each type, finish, and color.
4. End Cap: Full size.

E. Delegated-Design Submittal: For design of seismic restraints and attachment devices.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Linear pattern.

2. Joint pattern.
3. Ceiling suspension members.
4. Method of attaching hangers to building structure.
5. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
6. Ceiling perimeter and penetrations through ceiling; trim and moldings.
7. Minimum Drawing Scale: 1/8 inch = 1 foot.

B. Qualification Data: For professional engineer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each linear metal ceiling.

D. Evaluation Reports: For linear metal ceiling and components and anchor type.

E. Field quality-control reports.

F. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each set of linear metal pans and suspension systems from one source with resources to provide products of consistent quality in appearance, physical properties, and performance.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver linear metal pans, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Handle linear metal pans, suspension system components, and accessories carefully to avoid damaging units and finishes in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install linear metal ceilings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 COORDINATION

A. Coordinate layout and installation of linear metal pans and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 WARRANTY

A. Special Warranty for Linear Metal Ceilings and Suspension Systems: Manufacturer's standard form in which manufacturer agrees to replace panel ceilings and suspension systems that fail in materials or workmanship within specified warranty period.

1. Failure of ceiling panels includes sagging and warping, and growth of mold, mildew and stain causing bacteria.
2. Failure of suspension systems includes rusting.
3. Warranty does not cover damages that may occur from vibrations, fire, water, freezing temperatures, accident or any form of abuse or exposure to abnormal conditions.
4. Warranty Period: One year from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Linear Metal Ceiling Components: Quantity of each pan, carrier, accessory, and exposed molding and trim equal to 2 percent of quantity installed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements" to design seismic restraints and attachment devices.

B. Structural Performance: Exterior linear metal ceilings shall withstand exterior exposure and the effects of gravity loads and the following loads and stresses without showing permanent deformation of ceiling system components including pans and suspension system; noise or metal fatigue caused by vibration, deflection, and displacement of ceiling pans; or permanent damage to fasteners and anchors:

1. Wind Loads: Determine loads based on Components and Cladding Wind Pressure Chart on Structural Drawings, and in accordance with the New York State Building Code.

C. Seismic Performance: Linear soffit shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and the New York State Building Code.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.

E. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 450 or less.

2.2 ALUMINUM PANS AND SUSPENSION SYSTEM FOR LINEAR METAL CEILING

A. Aluminum Pans and Suspension System:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Longboard; 4" V-Groove Soffit #101802** or comparable product by the following:

a. ATAS International, Inc.; Linear Ceiling Series.
b. Hunter Douglas Contract; Woodwright 300C.

B. Perforation: Non-perforated.

C. Pan Thickness: Not less than 0.028 inch.

D. Pan Edge Detail: Manufacturer's standard edge detail, with bevel at long edges and short edges form hook-on return flanges.

E. Linear Module Width and Pan Face Width: 4 inches minimum, fabricated to provide a beveled edge joint between panels when installed.

F. Pan Face Finish:

1. Color: Dark Cherry.

G. End Cap, Finish of Exposed Portions: To match pan.

H. Suspension-System Main-Carrier Material: Manufacturer's standard material and protective finish.

1. Concealed carrier suspension system: Formed, inverted V-shaped, 0.95 mm (0.040 inch) thick roll-formed aluminum, by 62 mm (2.45 inch) high carrier sections. Pre-punch carrier cross sections, that are to receive ceiling panels, with prongs for snap attachment and support of panel side edges.

a. Provide manufacturer's standard metal carrier suspension system components, including splices, connector wire clips, hanger rods and adjustment springs, PVC closing pieces and trim for panel end attachment to wall.

2.3 LINEAR METAL CEILING PANS

A. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.

1. Aluminum Sheet: Roll-formed aluminum sheet, complying with ASTM B 209; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

    a. Painted Finishes: Electrolytic zinc-coated steel complying with ASTM A 591/A 591M, 40Z coating; surface treatment as recommended by finish manufacturer for type of use and finish indicated.

B. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated to snap on and be securely retained on carriers without separate fasteners, and finished to comply with requirements indicated.

C. Pan Splices: Construction same as pans, in lengths 8 to 12 inches; with manufacturer's standard finish.

D. End Caps: Metal matching pans; fabricated to fit and conceal exposed ends of pans.

E. Moldings and Trim: Provide manufacturer's standard moldings and trim for exposed members, and as indicated or required, for edges and penetrations of ceiling, around fixtures, at changes in ceiling height, and for other conditions; of same metal and finish as linear metal ceiling pans.

2.4 METAL SUSPENSION SYSTEMS

A. Metal Suspension Systems Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Suspension Systems: Provide systems complete with carriers, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, fixture adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

1. Postinstalled Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

    a. Type: Postinstalled expansion anchors.
    b. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchors.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Suspension System: ASTM C 645, direct-hung, double-web suspension system composed of main beams and cross-furring members that interlock. Hot dipped galvanized per ASTM A 653.

1. Furring Runners: Manufactured from 0.020-inch-thick steel, 1-1/2-inches wide by 1-1/2- inches high.
2. Furring Tees: Manufactured from 0.020-inch-thick steel, 1-1/2-inches wide by 1-1/2- inches high with staked-on clip couplings, factory punched cross tee slots, and hanger holes.

G. Carrier Splices: Same metal, profile, and finish as indicated for carriers.

H. Stabilizer Channels, Tees, and Bars: Manufacturer's standard components for stabilizing main carriers at regular intervals and at light fixtures, air-distribution equipment, access doors, and other equipment; spaced as standard with manufacturer for use indicated; and factory finished with matte-black baked finish.

I. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

J. Exterior Bracing: Cold-rolled steel channels and angles, hot-dip galvanized to comply with ASTM A 653/A 653M, G60 coating designation; size and profile as required to withstand wind load.

K. Hold-Down Clips: Manufacturer's standard hold-down clips spaced as standard with manufacturer.

L. Edge Moldings and Trim: Provide exposed members as indicated or required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of penetrations through ceiling, to conceal ends of pans and carriers, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching linear metal pans or extruded plastic unless otherwise indicated.

1. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which linear metal ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of linear metal ceilings.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of linear metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width or -length pans at borders, and comply with layout shown on reflected ceiling plans and Coordination Drawings.

3.3 INSTALLATION

A. Comply with ASTM C 636 and seismic requirement indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate to which hangers are attached and for type of hanger involved.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers but without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of linear metal ceiling area and where necessary to conceal edges and ends of linear metal pans.

1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system carriers so they are aligned and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Cut linear metal pans for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

G. Install linear metal pans in coordination with suspension system and exposed moldings and trim.

1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.
3. Install pans with butt joints using internal pan splices and in the following joint configuration:

    a. Aligned.

4. Where metal pan ends are visible, install end caps unless trim is indicated.

3.4 CLEANING

A. Clean exposed surfaces of linear metal ceilings, including trim and edge moldings after removing strippable, temporary protective covering if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION 074213.53

SECTION 074646 – FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Exterior, panelized fiber cement cladding system and accessories to complete a drained and back-ventilated rainscreen.

B. Related Sections include the following:

1. Division 07 Section “Water Resistive Air Barrier Membranes.”
2. Division 07 Section "Sheet Metal Flashing and Trim" for flashing and other sheet metal work.
3. Division 07 Section "Joint Sealants."

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Cementitious wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation layouts of cementitious wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.

1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:

a. Flashing and trim.
b. Anchorage systems.
c. Fastening patterns.

C. Samples for Initial Selection: For siding, soffit and trim, including related accessories.

D. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- square Sample of wall panel.
2. 12-inch- long-by-actual-width Samples of trim and accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of fiber-cement siding, signed by product manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.

C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full lengths of fiber-cement siding and soffit including related accessories, in a quantity equal to 1 percent of amount installed.

1.8 QUALITY ASSURANCE

A. Mockup: Build mockup to verify selections made under sample submittals and to demonstrate aesthetic effects.

1. Build mockup of typical wall area for each type of siding as directed by Architect.
2. Build mockup approximately 48 inches long by 60 inches high.

a. Include outside corner including fiber-cement trim on one end of mockup and inside corner on other end.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weathertight place.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with siding installation only if substrate is completely dry and if existing and forecasted weather conditions permit siding to be installed according to manufacturer's written instructions.

1.11 SEQUENCING

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.12 WARRANTY

A. Special Warranty for Fiber Cement Siding: Manufacturer's standard form in which manufacturer agrees to repair or replace siding that does not comply with requirements or that fails within specified warranty period. Failures include, but are not limited to, cracking, deforming, or otherwise deteriorating beyond normal weathering.

1. Warranty Period: 15 years from date of Substantial Completion.
2. Finish Warranty Period: 15 years from date of Substantial Completion.

B. Special Project Warranty: Submit Installer's warranty, signed by Installer, covering Work of this Section, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

2.2 FIBER-CEMENT PANEL SIDING

A. Fiber-Cement Panel Siding: Siding made from fiber-cement board that does not contain asbestos fibers; complies with ASTM C 1186, Type A, Grade II; is classified as noncombustible when tested according to ASTM E 136; and has a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Basis-of-Design Product: Subject to compliance with requirements, provide the following, or equal:

   a. Nichiha USA Inc.; Illumination Series.

2. Thickness: 5/8-inch.
3. Panel Size: 18 by 72 inches.

   a. Provide factory finished edges on all exposed horizontal panel edges.

4. Texture: Matte, smooth.
5. Factory Finish: Manufacturer's standard baked-on finish.

   a. Color: Custom color to match Architect's sample.

2.3 ACCESSORIES

A. Siding Accessories: Provide starter strips, edge trim, corner cap, and other items as recommended by siding manufacturer for building configuration.

   1. Provide accessories made from same material as adjacent siding, unless otherwise indicated.

B. Fasteners: Provide fasteners to comply with manufacturer's requirements.

   1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch into substrate.
   2. For fastening fiber-cement siding, use austenitic stainless-steel cladding, color matched fasteners.

C. Provide manufacturer's standard aluminum trim.

D. Ultimate Clip System:

   1. Starter Track:

      a. Horizontal Panel Installations - FA 700 – 3,030mm (l) galvalume coated steel.
      b. Vertical Panel Installations (AWP-3030 only) – FA 710T – 3,030mm (l) galvalume.

   2. Panel Clips: JEL 777 "Ultimate Clip" (10mm rainscreen for 16mm AWP) – Zinc-Aluminum-Magnesium alloy coated steel.

      a. Joint Tab Attachments (included) – used at all AWP-1818 panel to panel vertical joints. NOT used with AWP-3030 installations.

   3.
   4. Single Flange Sealant Backer – FHK 1017 (10mm) – 6.5' (l) fluorine coated galvalume.
   5. Double Flange Sealant Backer – FH 1020 (10mm) – 10' (l) fluorine coated galvalume.
   6. Corrugated Spacer – FS 1005 (5mm), FS 1010 (10mm) – 4' (l).
   7. Finish Clip – JE310 (5mm)

E. Flashing: Provide metal flashing complying with Division 07 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

F. Elastomeric Joint Sealant: Multicomponent urethane joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Uses M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 WALL PANEL INSTALLATION

A. General: Comply with panel system manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Fasten panels at 16 inches on center horizontally and 8 inches vertically.
2. Place fasteners exposed, minimum 3/8 inch from panel edges and 2 inches from top and bottom edges at panel corners.

B. Allow minimum vertical clearance between edge of panel system and adjacent materials in accordance with manufacturer's instructions.

C. Installation clearances:

1. Maintain 8 inches of clearance between panel system and adjacent finished grade.
2. Maintain 2 inches of clearance between panel system and horizontal surfaces other than at grade.
3. Allow minimum vertical clearance between edge of panel system and adjacent materials in accordance with manufacturer's instructions.

D. Wind Resistance: Install panels on framing members and secured with fasteners to resist wind loads indicated and in accordance with the New York State Building Code.

1. Basic Wind Speed: 115 mph.
2. Exposure Category: B.

E. Install vent screen and drainage flashing at bottom of wall panels above windows, penetrations and floor breaks.

F. Install a minimum 1/16-inch thickness of EPDM flashing installed on face of furring strips. Do not place aluminum trim pieces in contact with preservative- or fire-retardant treated wood.

G. Install metal trim:

1. Horizontal panel-to-panel joints: Install Horizontal Trim per Drawing layout. Horizontal joints to run continuously around corners.
2. Inside corners: Install Inside Corner Trim.
3. Outside corners: Install Outside Corner Trim.
4. Over openings in walls and at bottom of walls: Install Drip Cap Trim.

H. Fasten trim at maximum 16 inches on center.

I. Install joint sealants in accordance with manufacturer’s written instructions, as specified in Division 07 Section "Joint Sealants" and to produce a weathertight installation. Install sealants between panel system and adjacent surfaces as indicated, except at horizontal drainage flashings.

3.4 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective siding materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to siding manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074646

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Formed Products:

   a. Formed reglets and counterflashing.
   b. Formed low-slope roof sheet metal fabrications.
   c. Roof penetration flashing.

2. All hoisting and scaffolding necessary for the completion of the work.
3. Waste disposal.

B. Related Sections:

1. Division 04 Section “Unit Masonry” for furnishing and installing through wall flashing in masonry.
2. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
3. Division 07 Section “Roof Specialties” for manufactured roof edge specialties.

1.3 PREINSTALLATION CONFERENCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.
5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.

C. Fabrication Samples: For roof edge flashings made from 12-inch lengths of full-size components including fasteners, cover joints, accessories, and attachments.

D. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.

F. Qualification Data: For qualified fabricator.

G. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

H. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

A. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

C. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.8 COORDINATION

A. Coordinate installation of manufactured roof specialties with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Surface: Smooth, flat.
2. Exposed Coil-Coated Finish:

a. 2-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

C. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, of minimum uncoated weight (thickness) indicated; coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).

1. Products: Subject to compliance with requirements, provide the following:

a. Revere Copper Products, Inc.; FreedomGray.

D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 316, dead soft, fully annealed; with smooth, flat surface.

1. Finish: 2D (dull, cold rolled).

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Aluminum Sheet: Series 300 stainless steel.
3. Fasteners for Zinc-Tin Alloy-Coated Copper Sheet: Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

I. Do not use graphite pencils to mark metal surfaces.

2.4 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Counterflashing: Fabricate from the following material:

1. Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft.

B. Equipment Support Flashing: Fabricate from the following material:

1. Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft.

C. Roof-Penetration Flashing: Fabricate from the following material:

1. Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder aluminum sheet.
2. Pre-tinning is not required for zinc-tin alloy-coated copper.
3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements[, sheet metal manufacturer's written installation instructions,] and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.4 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "Unit Masonry."

3.6 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.7 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.8 WASTE DISPOSAL

A. Unless otherwise indicated, excess materials are Contractor's property. At completion of roofing work, remove from Project site.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof-edge specialties.

B. Related Requirements:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Division 07 Section "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 PREINSTALLATION CONFERENCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Coordinate the work of this Section with Owner’s separate contract for the installation of modified bituminous membrane roofing.
2. Meet with Owner, Architect, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.

2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

C. Samples: For each type of roof specialty and for each color and texture specified.

D. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.

E. Samples for Verification:

1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.
2. Include roof-edge specialties made from 12-inch lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI ES-1 tested.

C. Product Test Reports: For roof-edge flashings, for tests performed by a qualified testing agency.

D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are ANSI/SPRI ES-1 tested to specified design pressure.

B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.

1. Build mockup of typical roof edge approximately 10 feet long, including supporting construction, seams, attachments, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty for Roof Edge System: Manufacturer's standard form in which manufacturer agrees to provide a lifetime warranty for the roof edge system, when installed per manufacturer’s instructions.

1. Warranty Period: 20 years from date of Substantial Completion, not to exceed life of membrane roofing system.

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. SPRI Wind Design Standard: Manufacture and install roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 ROOF-EDGE SPECIALTIES

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **OMG Edge Systems; TerminEdge EX MB Fascia** or comparable product by one of the following:

   a. Hickman Company, W. P.
   b. Metal-Era, Inc.
   c. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.

2. Size: 8-1/4 inches.
3. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, 0.040 inch thick.

   a. Surface: Smooth, flat finish.
   b. Finish: Two-coat mica fluoropolymer.
   a. Color: Custom to match Architect’s sample.

4. Corners: Factory mitered and continuously welded.
5. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
6. Receiver: Extruded aluminum in manufacturer’s standard thickness, with pre-punched slotted holes. All bar miters are welded.

2.3 MATERIALS

A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.

B. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Aluminum Extrusion Finishes, Gutters and Downspouts:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    b. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF-EDGE SPECIALITIES INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls, including open penetrations.

B. Related Sections include the following:

1. Division 07 Section “Thermal Insulation” for fire safing insulation in non-fire rated horizontal floor/ceiling assemblies.
2. Division 07 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction.
3. Division 21 Sections specifying fire-suppression piping penetrations.
4. Division 22 Sections specifying plumbing piping penetrations.
5. Division 23 Sections specifying duct and piping penetrations.
6. Division 26 Sections specifying cable and conduit penetrations.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

3. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests is to be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:

1. Types of penetrating items.
2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.

C. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

D. Material Safety Data Sheets.

1.6 QUALITY ASSURANCE

A. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

    a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
    b. Classification markings on penetration firestopping correspond to designations listed by the following:

        1) UL in its "Fire Resistance Directory."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

C. Do not use products and materials that contain flammable solvents.

1.9 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3 that are produced by one of the following manufacturers:

1. Hilti, Inc.
2. 3M; Fire Protection Products Division.
3. Tremco; Tremstop Fire Protection Systems Group.

2.2 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

B. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

2.3 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

D. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

E. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

a. Slag-/rock-wool-fiber insulation.

b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
c. Fire-rated form board.
d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.4 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials required in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic or plastic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Pillows/Bags/Blocks: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.5 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems, and on both sides of partition, so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "WARNING - PENETRATION FIRESTOPPING SYSTEM - DO NOT DISTURB. NOTIFY BUILDING MANAGEMENT OF ANY DAMAGE."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

1. 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.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestop Systems with No Penetrating Items.

1. Available UL-Classified Systems: C-AJ-001-0999.

C. Firestop Systems for Metallic Pipes, Conduit or Tubing:

1. Available UL-Classified Systems: C-AJ-1001-1999 and W-L-1001-1999.

D. Firestop Systems for Nonmetallic Pipe, Conduit or Tubing:

1. Available UL-Classified Systems: C-AJ-2001-2999 and W-L-2001-2999.

E. Firestop Systems for Electrical Cables:

1. Available UL-Classified Systems: C-AJ-3001-3999 and W-L-3001-3999.

F. Firestop Systems for Cable Trays:

1. Available UL-Classified Systems: C-AJ-4001-4999 and W-L-3001-3999.

G. Firestop Systems for Insulated Pipes:

1. Available UL-Classified Systems: C-AJ-5001-5999 and W-L-5001-5999.

H. Firestop Systems for Miscellaneous Electrical Penetrants (Busducts):

1. Available UL-Classified Systems: C-AJ-6001-6999 and W-L-6001-6999.

I. Firestop Systems for Miscellaneous Mechanical Penetrants (Ductwork):

1. Available UL-Classified Systems: C-AJ-7001-7999 and W-L-7001-7999.

J. Firestop Systems for Groupings of Penetrants:

1. Available UL-Classified Systems: C-AJ-8001-8999 and W-L-8001-8999.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fire-resistive joint systems for the following:

1. Wall-to-wall joints.
2. Head-of-wall joints.

B. Related Sections include the following:

1. Division 07 Section "Penetration Firestopping" for systems installed in openings in walls and floors with and without penetrating items.
2. Division 07 Section "Joint Sealants" for non-fire-resistive joint sealants.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.
2. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests is to be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.

D. Qualification Data: For Installer.

E. Field quality-control test reports.

F. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICC ES AC30, from the ICC Evaluation Service.

G. Research/Evaluation Reports: For each type of fire-resistive joint system.

H. Material Safety Data Sheets.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements:

1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:

a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

C. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the following fire-resistive joint systems indicated for each application in the Fire-Resistive Joint System Schedule at the end of Part 3:

1. Hilti, Inc.; CFS-SP WB Firestop Joint Spray.
2. 3M; Fire Protection Products Division; FireDam™ Spray 200.
3. Tremco; Fire Protection Systems Group; Tremstop Acrylic.

2.2 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

C. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities indicated as determined by ASTM E 1966 or UL 2079.

1. Load-bearing capabilities as determined by evaluation during the time of test.

D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. VOC Content: Provide fire-resistive joint systems that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

F. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of 0 as determined by ASTM G 21.

G. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

H. Labels: Self-adhering labels for identification of fire-resistive joint systems and fire resistant rated partitions identified in Part 3.

1. Product: Subject to compliance with requirements, provide labels by the following, or equal:

a. Emedco (www.emedco.com).
b. Fire Wall Signs, Inc. (www.firewallsigns.com).
c. Seton (www.seton.com).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.

B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify fire-resistive joint systems with preprinted plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "WARNING - FIRE-RESISTIVE JOINT SYSTEM - DO NOT DISTURB. NOTIFY BUILDING MANAGEMENT OF ANY DAMAGE."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

B. Identify fire resistance rated walls including fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions required to have protected openings or through penetration firestopping. Attach labels permanently to surfaces so that labels will be visible to anyone seeking to install penetrating items or firestop systems. Use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted.

1. Locate labels above accessible ceilings and in attic spaces, spaced at intervals not exceeding 30 feet measured horizontally, along both sides of the wall or partition, and not less than 15 feet from end of wall.
2. For occupied spaces without a finished ceiling, coordinate location of labeling with Architect.
3. Include lettering not less than 3 inches in height incorporating the words "*1 HOUR* RATED *FIRE BARRIER* – PROTECT ALL OPENINGS AND PENETRATIONS." Specifically identify the hourly rating of the wall and the type of partition (i.e. fire wall, fire barrier, fire partition) for each condition.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.

1. Inspection of fire resistive joints and perimeter fire barriers shall be performed in accordance with ASTM E 2393, "Standard Practice for On-Site Inspection of Installed Fire Resistive Joints and Perimeter Fire Barriers"

B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.

1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.

C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.

D. Additional inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Designation System for Joints in or between Fire-Resistance-Rated Constructions: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHBN.

B. Head-of-Wall Fire-Resistive Joint Systems:

1. Available UL-Classified Systems: HW-D-0000-0999.
2. Assembly Rating: As indicated.
3. Movement Capabilities: Class II – 25 percent compression or extension.

C. Wall-to-Wall, Fire-Resistive Joint Systems:

1. UL-Classified Systems: WW-D-0000-0999.
2. Assembly Rating: As indicated.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class II – 25 percent compression or extension.

END OF SECTION 078446

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

B. Related Sections include the following:

1. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Division 08 Section "Glazing" for glazing sealants.
3. Division 09 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
4. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.4 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.5 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

B. Qualification Data: For Installer.

C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

D. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Warranties: Special warranties specified in this Section.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

D. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:

1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
2. Each type of sealant and joint substrate indicated.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.8 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period for Urethane: Five years from date of Substantial Completion.
2. Warranty Period for Silicone: 20 years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.

2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Corning Corporation; 790.
b. Pecora Corporation; 890 NST.
c. Tremco Incorporated; Spectrem 1.

B. Mildew Resistant, Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Corning Corporation; 786 Mildew Resistant.
b. GE Silicones; Sanitary SCS1700.
c. Tremco; Tremsil 200 Sanitary.

2.3 URETHANE JOINT SEALANTS

A. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type M, Grade P, Class 25, for Use T and I.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation-Construction Systems; MasterSeal SL 2.
b. Pecora Corporation; Dynatrol II-SG.
c. Sherwin Williams; Loxon 2K SL.
d. Tremco; THC-900.

2.4 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following:

a. American Sealants, Inc.; ASI 174.
b. Pecora Corporation; AC-20+.
c. Sherwin Williams; 950A.
d. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:

1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
2. Products: Subject to compliance with requirements, provide one of the following:

a. Green Glue; Green Glue Noiseproofing Sealant.
b. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
c. Sherwin Williams; 950A.
d. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2.6 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

    a. Control and expansion joints in unit masonry.
    b. Perimeter joints between materials listed above and frames of doors and windows.
    c. Control and expansion joints in ceilings and other overhead surfaces.
    d. Other joints as indicated.

2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.

B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:

    a. Isolation joints in cast-in-place concrete slabs.

2. Urethane Joint Sealant: Multicomponent, pourable, traffic grade, Class 25.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.

C. Joint-Sealant Application: Interior joints in all other vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Perimeter joints of exterior openings where indicated.
    c. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.
    d. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    e. Other joints as indicated.

2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Other joints as indicated.

2. Joint Sealant: Single component, nonsag, mildew resistant, acid curing silicone.
3. Joint-Sealant Color: White.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces at counters and backsplashes.

1. Joint Sealant Location:

a. Joints between counters and walls.
b. Joints between backsplashes and walls.
c. Joints between counters and backsplashes.
d. Other joints as indicated.

2. Joint Sealant: Single component, nonsag, mildew resistant, acid curing silicone.
3. Joint-Sealant Color: Clear.

F. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Location:

a. Acoustical joints where indicated.
b. Other joints as indicated.

2. Joint Sealant: Acoustical.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 079200

SECTION 079201 – SPRAY FOAM SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes polyurethane spray foam sealant.

B. Related Sections include the following:

1. Division 07 Section "Joint Sealants" for sealants installed in interior and exterior surfaces.

1.3 PERFORMANCE REQUIREMENTS

A. Provide spray foam sealant engineered to fill voids and seal gaps without deteriorating substrates.

1.4 SUBMITTALS

A. Product Data: For spray foam sealant.

B. Product Certificates: For spray foam sealant and accessories, signed by product manufacturer.

C. Evaluation Reports: For spray foam sealant, from ICC-ES.

D. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming sealant substrates have been tested for compatibility and adhesion with spray from sealant, including all types of aluminum framing systems, and fluid-applied membrane air barriers.

E. Certification from sealant manufacturer that products supplied comply with State of New York regulations controlling the use of volatile organic compounds (VOC's).

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain spray foam sealant through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials in original containers in cool, dry area at room temperature between 60 and 70 deg. F. Do not store materials above 90 deg. F.

1.7 PROJECT CONDITIONS

A. Do not proceed with installation of spray foam sealant under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 45 deg. F.
2. When joint substrates are wet.
3. Contaminants capable of interfering with adhesion have not yet been removed from substrate.

PART 2 - PRODUCTS

2.1 SPRAY FOAM SEALANTS

A. Polyurethane Spray Foam Sealant: Single or two-component, polyurethane foam sealant packaged in self-contained pressurized containers, gun-grade, containing no urea formaldehyde, and UL Classified.

1. In accordance with ASTM E 84, provide products with a flame spread of 25 and smoke developed of 450.
2. Properties:

a. Cure Time: 8-24 hours at 75 deg. F, 50% relative humidity.
b. Air infiltration at 6.24 psf pressure per in 1 cm wide gap: ASTM E 283, less than 0.01 cfm/ft^2.
c. Water Vapor Transmission, per inch thickness: ASTM E 96, less than 4 perms.
d. R-Value: 4 to 5 per inch, minimum.
e. Closed Cell Content: ASTM D 2856, 70% or greater.
f. Core Density: Minimum 1.7 lbs./cu.ft.
g. Pressure Build: Comply with AAMA 812-04.

3. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Building Solutions; Great Stuff Pro Window & Door.
b. Fomo Products, Inc.; Handi-Seal Window and Door Sealant.
c. Hilti; CF 812 Window and Door Low-Pressure Filler Foam.

B. Cleaner: Manufacturer's standard for cleaning substrates and to clean up foam spills, overspray, tools and nozzles before foam cures.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine voids and substrates to receive spray foam sealant, with Installer present, for compliance with requirements and conditions affecting foam sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

A. Remove foreign material that could interfere with adhesion of spray foam sealant, including dust, oil, grease, water, repellants, water, and surface dirt.

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous surfaces with cleaner that does not stain, harm substrate, or leave residue capable of interfering with adhesion of spray foam sealants.

3.3 INSTALLATION

A. General: Comply with spray foam sealant manufacturer's written instructions for products and applications indicated.

B. Install foam sealant at exterior frames of aluminum storefront and entrance frames, and glazed aluminum curtain walls.

1. Fill cavities 30-40%, allowing foam to expand approximately three times its original dispensed volume.

3.4 CLEANING AND PROTECTING

A. Protect adjacent surfaces from overspray. If required, clean spills before product cures.

B. Protect spray foam from exposure to sunlight.

C. Proceed with installation of joint sealants by Division 07 Section "Joint Sealants."

END OF SECTION 079201

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes hollow-metal work.

B. Related Requirements:

1. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
2. Division 08 Section "Glazing" for glazed lites in hollow metal doors and frames.
3. Division 09 Section “Painting” for field painting hollow metal doors and frames.
4. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Architect, electrical contractor, security systems supplier, and hardware installers whose work interfaces with or affects hollow metal doors and frames.
2. Review requirements for type of cut-out and back-box as part of the door and frame assembly.
3. Document proceedings, including receipt of samples and approved shop drawings of security contact devices which accurately represent the installation of the device, back-box, and conduit terminations required.
4. Distribute an installation book, including all manuals and instructions.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door; ASSA ABLOY.
2. Curries Company; ASSA ABLOY.
3. DE LA FONTAINE.
4. Steelcraft; an Allegion brand.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.3 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (18 gauge).

1) Provide 16 gauge face sheets for doors over 3’-0” wide.

d. Edge Construction: Model 2, Seamless.
e. Core: Vertical steel stiffener with fiberglass insulation.
f. Fire Rated Core: Mineral fiber.

3. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (16 gauge).
b. Construction: Face welded.

4. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

E. Glazing: Comply with Division 08 Section "Glazing."

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Fire Door Cores: As required to provide fire-protection ratings indicated.
3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
4. Top Edge Closures: Close top edges of doors with inverted closures.
5. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
6. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
3. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

1) Three anchors per jamb from 60 to 90 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Four anchors per jamb from 60 to 90 inches high.

c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

4. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
3. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

F. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with manufacturer's standard gauges and sizes, but not less than the following minimum sizes.

1. Hinges: Minimum 10 gauge by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
2. Lock Face, Flush and Surface Bolts, Closers, and Concealed Holders: Minimum 14 gauge.
3. Pull Plates and Bar: Minimum 16 gauge.

G. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.

f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. In-Place Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
e. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80, and the following:

a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
c. Between Bottom of Door and Top of noncombustible Threshold: Maximum 3/8 inch.
d. Between Bottom of Door and Top of noncombustible Finish Floor (No Threshold): Maximum 3/4 inch.
e. Between Bottom of Door and all other Finish Floor Coverings: Maximum 1/2 inch.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in Division 09 Section “Painting.”

END OF SECTION 081113

SECTION 083113 – ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Access doors and frames for walls and ceilings.

B. Related Sections include the following:

1. Division 04 Section “Unit Masonry” for anchoring and grouting access door frames in masonry construction.
2. Division 08 Section "Door Hardware" for mortise or rim cylinder locks and master keying.
3. Division 09 Section “Painting” for field finishing factory-primed access doors and frames.
4. Division 23 Section for heating and air-conditioning duct access doors.

1.3 SUBMITTALS

A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.4 QUALITY ASSURANCE

A. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for vertical access doors and frames.
2. ASTM E 119 or UL 263 for horizontal access doors and frames.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Source Limitations: Obtain access doors and frames through one source from a single manufacturer.

B. Basis of Design Product: Subject to compliance with requirements, provide product indicated, or comparable product by one of the following:

1. J. L. Industries, Inc.
2. Karp Associates, Inc.
3. Larsen's Manufacturing Company.
4. Milcor Inc.
5. Nystrom, Inc.

C. Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: Babcock Davis; Model BNT.
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall and ceiling, gypsum board and masonry walls.
4. Uncoated Steel Sheet for Door: Nominal 14 gage.
    a. Finish: Factory prime.
5. Frame Material: Nominal 16 gauge, factory prime.
6. Hinges: concealed pivoting rod hinge.
7. Hardware: Mortise cylinder preparation.
8. Door Size: 12x12.

D. Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: Babcock Davis; Model BNT.
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall, gypsum board and masonry walls with ceramic tile finish.
4. Stainless-Steel Sheet for Door: Nominal 14 gage.
    a. Finish: No. 4.
5. Frame Material: Nominal 16 gauge, stainless steel.
6. Hinges: concealed pivoting rod hinge.

7. Hardware: Mortise cylinder preparation.
8. Door Size: 12x12.

E. Fire-Rated, Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: Babcock Davis; BU-Series Model BUT.
2. Assembly Description: Fabricate door to fit flush to frame, uninsulated. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall and ceiling, gypsum board.
4. Fire-Resistance Rating: Not less than 1 hour.
5. Uncoated Steel Sheet for Door: Nominal 14 gage.

    a. Finish: Factory prime.

6. Frame Material: Nominal 16 gauge, factory prime.
7. Hinges: concealed pivoting rod hinge.
8. Hardware: Mortise cylinder preparation.
9. Door Size: 12x12.

F. Hardware:

1. Lock: Mortise cylinder.

    a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware."

2.3 MATERIALS

A. Steel Sheet: Uncoated cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.

C. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Exposed Flanges: As indicated.
2. Provide mounting holes in frames for attachment of units to metal framing.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder lock, furnish two keys per lock and key all locks alike.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

E. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.
b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
c. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 084113 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior storefront framing.
2. Interior and exterior manual-swing entrance doors and door-frame units.

B. Related Sections:

1. Division 06 Section “Miscellaneous Rough Carpentry” for wood blocking.
2. Division 07 Section “Sheet Metal Flashing and Trim.”
3. Division 07 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
4. Division 07 Section “Spray Foam Sealants” for spray foam sealant furnished and installed by this Section.
5. Division 08 Section “Glazed Aluminum Curtain Walls.”
6. Division 08 Section "Door Hardware" for hardware to the extent not specified in this Section.
7. Division 08 Section "Glazing" for glazing requirements to the extent not specified in this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

    a. With the exception of weatherstripping, hardware is furnished under Division 08 Section “Door Hardware.”
    b. Indicate coordination of security door contacts with security system requirements.

1) Do not prepare doors and frames without an approved security systems shop drawing and sample of the Contract.

C. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

C. Welding certificates.

D. Preconstruction Test Reports: For sealant.

E. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

F. Source quality-control reports.

G. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, and in-service performance.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

D. Accessible Entrances: Comply with applicable provisions in 2010 ADA Standards and ICC/ANSI A117.1.

E. Source Limitations for Aluminum-Framed Systems: Obtain glazed aluminum curtain walls and aluminum-framed entrance and storefront systems from a single source from a single manufacturer.

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."

G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as directed by the Architect.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Adhesive or cohesive sealant failures.
e. Water leakage through fixed glazing and framing areas.
f. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:

a. Deflection exceeding specified limits.
b. Thermal stresses transferring to building structure.
c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
d. Glazing-to-glazing contact.
e. Noise or vibration created by wind and by thermal and structural movements.
f. Loosening or weakening of fasteners, attachments, and other components.
g. Sealant failure.
h. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of New York, using performance requirements and design criteria indicated.

C. Structural Loads:

1. Wind Loads: Provide entrance systems capable of withstanding wind-load design pressures calculated using a “design wind pressure” as determined from the New York State Building Code, and as determined by the Fabricator’s design engineer.

a. Basic Wind Speed: 130 mph.
b. Risk Category: III.
c. Exposure Category: B.

2. Seismic Loads: Provide entrance systems capable of withstanding the effects of earthquake motions calculated according to the New York State Building Code, as determined by the Fabricator’s design engineer.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below them to less than 1/8 inch and clearance between members and operable units directly below them to less than 1/16 inch.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

G. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.
2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

H. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

I. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 55 when tested according to AAMA 1503.

J. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of **0.36** and not more than **0.38** Btu/sq. ft. x h x deg F when tested according to AAMA 1503, and glazed with 1-inch insulated glass units.

K. Thermal Conductance of Doors: Provide aluminum-framed doors with fixed glazing having an average U-factor of not more than **0.77** Btu/sq. ft. x h x deg F when tested according to AAMA 1503, and glazed with 1-inch insulated glass units.

2.2 INTERIOR FRAMING SYSTEMS

A. Basis of Design Product: Subject to compliance with requirements, provide **Kawneer; Trifab VG 451** or one of the following:

1. EFCO; Series 402NT.
2. Wausau Window and Wall Systems; 14000 I/O Series.

B. Framing Members: Manufacturer's standard extruded-aluminum framing members, minimum wall thickness of .080", and reinforced as required to support imposed loads.

1. Construction: Non-thermal.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Center.
4. Depth of Frame: Not less than 4-1/2".
5. Face of Frame: Not less than 2".

2.3 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 FRAMING SYSTEMS, GENERAL

A. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads to install hardware only, finished to match framing system.

C. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

E. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

F. Provide UL listed electrical back boxes of suitable size to allow termination of 1/2-inch EMT or 3/4-inch flexible metallic conduit at the following locations:

1. Openings to receive security system devices.
2. Openings to receive electrified locksets.
3. Openings to receive electrified power transfer hinges.

2.5 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

2.6 EXTERIOR ENTRANCE DOOR SYSTEMS

A. General: Provide exterior entrance door systems at all exterior doors and interior vestibule doors.

B. Basis of Design Product: Subject to compliance with requirements, provide **Kawneer; 500 Heavy Duty Entrance Door** or one of the following

1. EFCO; D518 Heavy Duty Entrance Door.
2. Wausau Window and Wall Systems; Monumental Doors.

C. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 2-inch overall thickness, with minimum 0.188-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: Wide stile; 5-inch nominal width, with custom top and bottom rails in sizes indicated.

    a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

4. Provide an integral 1/2-inch diameter wire tube in doors to receive electrified locksets, panic bars, mortised electric locksets, or electric strikes in the inactive leaf of pairs of doors to accommodate wiring associated with power transfer hinges, knuckles, and electrified hardware within the door.

2.7 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: For hardware other than that furnished by this Section, as specified in Division 08 Section "Door Hardware" and in the hardware sets included in the Door and Hardware Schedule.

B. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

C. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

D. Silencers: BHMA A156.16, Grade 1.

2.8 ACCESSORIES

A. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

B. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

1. Comply with requirements in Division 07 Section “Sheet Metal Flashing and Trim” for aluminum sheet. Provide custom color to match aluminum framing.

C. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.9 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, furnished and installed by Division 07 Section "Joint Sealants."

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.10 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.

2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate components for assembly using screw-spline system.

1. Mullions: Provide mullions and cover plates as shown, matching curtainwall units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of curtainwall units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of curtainwall units.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. Prepare doors and frames to receive security systems hardware in accordance with final security systems shop drawings and templates provided by security systems hardware supplier.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.11 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Furnish and install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Furnish and install spray foam sealant at frame locations indicated.

I. Install joint sealants specified in Division 07 Section "Joint Sealants", to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of installed storefronts shall take place as follows:

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Commissioning Authority shall be tested according to AAMA 501.2 and shall not evidence water penetration.

a. Perform a minimum of three tests in areas as directed by Commissioning Authority.
b. Perform tests in each test area as directed by Commissioning Authority. Perform at least three tests, initial installation and prior to 25 and 75 percent completion.

2. Air Infiltration: ASTM E 783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.

a. Perform a minimum of three tests in areas as directed by Commissioning Authority.
b. Perform tests in each test area as directed by Commissioning Authority. Perform at least three tests, initial installation and prior to 25 and 75 percent completion.

3. Water Penetration: ASTM E 1105 at a minimum cyclic static-air-pressure differential at 100 percent of the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. and shall not evidence water penetration.

C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.5 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors indicated to be accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

B. Clean aluminum surfaces immediately after installing aluminum-framed systems. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installation. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

E. Protect aluminum framed surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 084113

SECTION 084413 – GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Glazed aluminum curtain walls.

B. Related Sections:

1. Division 06 Section “Miscellaneous Rough Carpentry” for wood blocking.
2. Division 07 Section “Sheet Metal Flashing and Trim” for formed aluminum plate assemblies furnished and installed by this Section.
3. Division 07 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
4. Division 07 Section “Spray Foam Sealants” for spray foam sealant furnished and installed by this Section.
5. Division 08 Section “Aluminum-Framed Entrances and Storefronts” for aluminum entrance doors installed in glazed aluminum curtain walls.
6. Division 08 Section "Glazing" for glazing requirements to the extent not specified in this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of New York using performance requirements and design criteria indicated.

B. General Performance: Comply with performance requirements specified, as determined by preconstruction testing of manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum curtain walls shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.

C. Structural Loads:

1. Wind Loads: Provide glazed aluminum curtain wall systems capable of withstanding wind-load design pressures calculated using a "design wind pressure" as determined from the New York State Building Code, and as determined by the Fabricator's design engineer.

a. Basic Wind Speed: 130 mph.
b. Risk Category: III.
c. Exposure Category: B.

2. Seismic Loads: Provide glazed aluminum curtain wall systems capable of withstanding the effects of earthquake motions calculated according to the New York State Building Code, as determined by the Fabricator's design engineer.

D. Structural-Test Performance: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below them to less than 1/8 inch and clearance between members and operable units directly below them to less than 1/16 inch.
3. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.

F. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.
2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

G. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

H. Energy Performance: Glazed aluminum curtain walls shall have certified and labeled energy performance ratings in accordance with NFRC.

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than **0.38** Btu/sq. ft. x h x deg F as determined according to NFRC 102.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than **0.40** as determined according to NFRC 200.
3. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft.
4. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC- certified condensation resistance rating of no less than 79 at frame and 76 at glass as determined according to NFRC 500.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

F. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Seismic Qualification Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

C. Welding certificates.

D. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.

E. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for glazed aluminum curtain walls, indicating compliance with performance requirements.

F. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed energy performance requirements indicated and of documenting this performance by certification, labeling, and inclusion in lists.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

D. Source Limitations for Aluminum-Framed Systems: Obtain glazed aluminum curtain walls and aluminum-framed entrance and storefront systems from a single source from a single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

F. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

1. Provide NFRC-certified glazed aluminum curtain walls with an attached label.

G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as directed by the Architect.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Special Assembly Warranty: Standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain walls that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FRAMING

A. Basis of Design Product: Subject to compliance with requirements, provide **Kawneer North America; 1600 Wall System 1** or comparable product by one of the following:

1. EFCO Corporation; XTherm 5600.
2. Wausau Window and Wall Systems; SuperWall.

B. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of minimum wall thickness of 0.093-inch to 0.125-inch and reinforced as required to support imposed loads.

1. Construction: Thermally improved.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Depth of Frame: Not less than 6 inches.
5. Face of Frame: Not less than 2-1/2”.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from 300 series stainless steel.

E. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

F. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

G. Framing Sealants: Manufacturer's standard sealants.

2.2 GLAZING

A. Glazing: Furnish and install insulated glazing as specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Glazing gaskets shall comply with ASTM C 864 and be extruded of a silicone compatible EPDM rubber that provides for silicone adhesion.

C. Glazing Sealants: As recommended by manufacturer.

2.3 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 OPERABLE UNITS

A. Doors: Comply with Division 08 Section "Aluminum-Framed Entrances and Storefronts."

2.5 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.6 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Fabricate components that, when assembled, have the following characteristics:

1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

E. Curtain-Wall Framing: Fabricate components for assembly using screw-spline system.

F. Mullions: Provide mullions and cover plates as shown, matching curtainwall units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of curtainwall units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of curtainwall units.

G. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Seal joints watertight unless otherwise indicated.
3. Install glazing to comply with requirements in Division 08 Section "Glazing."

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified in Division 08 Section "Glazing."

F. Furnish and install spray foam sealant at frame locations indicated.

G. Install joint sealants specified in Division 07 Section "Joint Sealants", to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

   a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
   b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
   c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Test Area: Perform tests on representative areas of glazed aluminum curtain walls.

C. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls:

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Commissioning Authority shall be tested according to AAMA 501.2 and shall not evidence water penetration.

   a. Perform a minimum of three tests in areas as directed by Commissioning Authority.

b. Perform tests in each test area as directed by Commissioning Authority. Perform at least three tests, initial installation and prior to 25 and 75 percent completion.

2. Air Infiltration: ASTM E 783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.

a. Perform a minimum of three tests in areas as directed by Commissioning Authority.
b. Perform tests in each test area as directed by Commissioning Authority. Perform at least three tests, initial installation and prior to 25 and 75 percent completion.

3. Water Penetration: ASTM E 1105 at a minimum cyclic static-air-pressure differential at 100 percent of the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. and shall not evidence water penetration.

D. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 ADJUSTING, CLEANING, AND PROTECTION

A. Clean aluminum surfaces immediately after installing curtain wall systems. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect curtain wall surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 084413

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

a. Swinging doors.
b. Other doors to the extent indicated.

2. Cylinders for doors specified in other Sections.
3. Electrified door hardware.

B. Related Sections include the following:

1. Division 08 Section "Hollow Metal Doors and Frames" for astragals provided as part of fire-rated labeled assemblies.
2. Division 08 Section "Access Doors and Frames" for access door hardware, except cylinders.
3. Division 08 Section "Aluminum-Framed Entrances and Storefronts" for entrance door hardware to the extent not specified in this section.
4. Division 26 Sections for connections to electrical power system and for low-voltage wiring work.
5. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access system.
6. Division 28 Section "Intrusion Detection" for detection devices installed at door openings and provided as part of an intrusion detection system.
7. Division 28 Section "Fire Detection and Alarm" for connections to building fire alarm system.

1.3 SUBMITTALS

A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: Power, signal, and control wiring. Include the following:

a. System schematic.
b. Point-to-point wiring diagram.
c. Riser diagram.
d. Elevation of each door.

2. Detail interface between electrified door hardware and fire alarm, access control, and/or security systems. Coordinate installation details for electrified door hardware with approved shop drawings for these systems.
3. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

C. Samples for Verification: For exposed door hardware of each type, in specified finish, full size. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.

1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

D. Product Certificates: For electrified door hardware, signed by product manufacturer.

1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

E. Qualification Data: For Architectural Hardware Consultant.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, latches, delayed-egress locks, and closers.

G. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include the following:

1. Final hardware schedule, as-built.
2. Keying schedule.
3. Product cut sheets for each item installed.
4. Parts list and numbers for each item installed.
5. Maintenance information for each item installed.
6. Name, address and phone number of local representative of each item installed.

H. Warranty: Special warranty specified in this Section.

I. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of the Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

    a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
    b. Content: Include the following information:

        1) Identification number, location, hand, fire rating, and material of each door and frame.
        2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
        3) Complete designations of every item required for each door or opening including name and manufacturer.
        4) Fastenings and other pertinent information.
        5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) Door and frame sizes and materials.
9) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.

10) List of related door devices specified in other Sections for each door and frame.
11) Name, address and phone number of local representative of each item installed.

c. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant and following Keying Conference, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

1.4 QUALITY ASSURANCE

A. Comply with State University Construction Fund for door hardware requirements in addition to those specified herein.

B. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.

1. Installer's responsibilities include supplying and installing door hardware, and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
2. Installer shall have warehousing facilities in Project's vicinity.
3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
4. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

C. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

1. Electrified Door Hardware Consultant Qualifications: A qualified Architectural Hardware Consultant who is experienced in providing consulting services for electrified door hardware installations.

D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

E. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

F. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

G. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1 and 2010 ADA Standards.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:

    a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

H. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Owner's Representative, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

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. Address for delivery of keys.

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Owner's Representative, Contractor, and Architect, a representative of each major hardware category shall be present to instruct installers on the proper installation and adjustment of door hardware. Review methods and procedures related to installation of door hardware including, but not limited to, the following:

1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
2. Review sequence of operation for each type of electrified door hardware.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

1. Each item to be individually packaged in manufacturer's original container.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.6 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, and/or security systems.

C. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of operators and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: One year from date of Substantial Completion, except as follows:

a. Exit Devices: Three years from date of Substantial Completion.
b. Manual Closers: 10 years from date of Substantial Completion.
c. Hinges: Lifetime.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish two complete sets of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware. Furnish two extra fasteners of each type and finish installed.

B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets indicated in door and frame schedule, and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

C. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies.
b. McKinney Products Company; an ASSA ABLOY Group company.
c. Stanley Commercial Hardware.

2. Mounting: Full mortise (butts).
3. Bearing Material: Ball bearing.
4. Grade: Grade 1 (heavy weight).
5. Base and Pin Metal:

a. Exterior Hinges: Stainless steel with stainless-steel pin.
b. Interior Hinges: Steel with steel pin**.**
c. Hinges for Fire-Rated Assemblies: Steel with steel pin.

6. Pins: Non-rising loose, unless otherwise indicated.

a. Outswinging Exterior Doors: Nonremovable.
b. Outswinging Corridor Doors with Locks: Nonremovable.

7. Tips: Flat button.
8. Corners: Square.

B. Quantity: Provide the following, unless otherwise indicated:

1. Three Hinges: For doors with heights 61 to 90 inches.
2. Four Hinges: For doors with heights 91 to 120 inches.
3. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

C. Fasteners: Comply with the following:

1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.

2.3 CONTINUOUS HINGES

A. Provide continuous hinges at all exterior doors.

B. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves; joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bommer Industries, Inc.
b. Hager Companies; Hager-Roton.
c. McKinney Products Company; an ASSA ABLOY Group company.
d. Pemko Manufacturing Co.

2. Grade: Grade 1-150.
3. Mounting: Full surface, with removable continuous caps over fasteners.
4. Electric Option: Coordinate with security requirements.

2.4 MECHANICAL LOCKS AND LATCHES

A. Mortise Locks: Stamped steel case with steel or brass parts; BHMA A156.13, Grade 1, Series 1000, heavy-duty.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Best Access Systems, Div. of The Stanley Works; Series 45H.
b. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group company; Series ML2000.
c. SARGENT Manufacturing Company, an ASSA ABLOY Group company; Series 8200.
d. Schlage Commercial Lock Division, an Allegion Company; Series L.

B. Lock Functions: As indicated in door hardware schedule.

C. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Mortise Locks: Minimum 3/4-inch latchbolt throw.

D. Lock Backset: 2-3/4 inches.

E. Lock Trim:

1. Levers: Solid brass, bronze or stainless steel; cast or forged and through-bolted with a 2-piece spindle.

a. Provide tactile warning at hazardous locations.

2. Escutcheons (Roses): Wrought.
3. Dummy Trim: Match lever lock trim and escutcheons.
4. Lockset Designs: Provide design indicated or, if sets are provided by another manufacturer, provide designs that match those designated.

F. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
3. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
4. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
5. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

2.5 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

A. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Glynn-Johnson.
b. Hager Companies.
c. IVES Hardware.
d. Trimco.

B. Automatic Flush Bolts: Grade 1, fabricated from steel and brass components, with spring-activated bolts that automatically retract when active leaf is opened and that automatically engage when active door depresses bolt trigger; listed and labeled for fire-rated doors. Provide brass or stainless-steel cover plate, top and bottom dustproof strikes, guides, guide supports, wear plates, and shims.

C. Dustproof Strikes: Locking type, Grade 1, polished wrought brass, with 3/4-inch- diameter, spring-tension plunger.

2.6 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company; 5000 Series.

b. Precision Hardware, Inc.; 1100/D-1200 Series.
c. SARGENT Manufacturing Company; an ASSA ABLOY Group company; 80 Series.
d. Von Duprin; an Allegion Company; 98/99 Series.

B. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

C. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

D. Fire-Exit Removable Mullions: Provide removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions shall be used only with exit devices for which they have been tested.

E. Outside Trim: Lever with cylinder; material, design and finish to match locksets, unless otherwise indicated.

1. Provide forged or cast escutcheon plates.
2. Provide knurled outside lever where scheduled.

F. Provide the following types of exit devices as scheduled:

1. Rim Exit Devices:

a. Type: BHMA A156.3, Type 1, rim.
b. Actuating Bar: Push pad.
c. Material: Brass, Bronze, Stainless steel or Aluminum.

2. Push Pad: Extend push pad a minimum of one-half of the door width. Provide flush mounted end cap with two-point attachment to the door.
3. Provide the following for each device:

a. Nylon bearings and stainless steel springs.
b. Security dead latching feature.
c. Spacers as required for flush mounting of mechanism case.
d. Glass bead kits for mounting of hardware on glass doors.

4. Provide all non-fire-rated exit devices with cylinder dogging, except at locations indicated with electric latch retraction or request-for-exit function.

G. Electrified Exit Device Options (as scheduled): Types and functions indicated as follows:

1. Request-for-Exit Function: Signal initiated when push bar is actuated.
2. Delayed Egress: Depressing push bar for more than 3 seconds initiates irreversible alarm and 15-second delay for egress. Fire alarm voids 15-second delay.
3. Electric Latch Retraction: Remote signal activates continuous-duty solenoid that retracts latch.
4. Power supplies: Furnished by Door Hardware supplier; installed by the Security Contractor.
5. Local Audible Alarms: Furnished and installed by Division 28 Section.

H. Tube-Steel Removable Mullions: BHMA A156.3, with malleable-iron top and bottom retainers, and prepared for strikes as follows:

1. Strikes: Two standard recessed strikes.

2.7 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. All locksets and cylinders shall be keyed into the existing Campus Master Key System for this project. Allow for 100% expansion. For the protection of the Campus, all cylinders shall be keyed at the factory where permanent records shall be established and maintained.

B. Cylinders: BHMA A156.5, Grade 1, manufacturer's standard tumbler type, constructed from brass, or bronze, stainless steel, or nickel silver, complying with the following:

1. Number of Pins: Seven (7).
2. Bored-Lock Type: Cylinders with tailpieces to suit locks.

a. High-Security Grade: BHMA A156.5, Grade 1A, listed and labeled as complying with pick- and drill-resistant testing requirements in UL-437 (SuffixA).

3. Proprietary product to match Campus standard as follows:

a. Best Access Systems; Premium Series. (no substitution).

C. Construction Keying: During construction, all new locksets shall be construction master keyed. Provide temporary construction cores. The Contractor shall receive ten (10) construction master keys. Under no circumstance shall the Contractor receive any permanent building master keys or change keys unless authorized by the Campus Representative.

1. All construction cores will be returned to General Contractor once Campus has received and installed final cores.

D. Permanent Cores: All permanent cores and keys shall be requested directly by the Campus to the manufacturer. The Contractor shall be responsible for all payments to the manufacturer and shall supply the Campus with all necessary information (account number, etc.), in order for the Campus to order final cores and keys.

2.8 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:

1. Master Key System: Cylinders are operated by a change key and a master key.
2. Existing System: Re-key Campus' existing master key system into new keying system.
3. Keyed Alike: Key all cylinders to same change key.
4. All master keys shall be identified with a registry number, and shall **not** be stamped with MASTER or letter M.

B. Keys: Nickel silver.

1. Quantity: In addition to two extra key blanks for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Two.

2. All keying shall be thoroughly checked with the Campus Representative. Final keying requirements shall be submitted in writing, for final approval by the Campus Representative.

2.9 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burns Manufacturing Incorporated.
b. Hager Companies.
c. IVES Hardware; an Ingersoll-Rand Company.
d. Rockwood Manufacturing Company.
e. Trimco.

B. Flat Push Plates: 0.050 inch thick, 4 inches wide by 16 inches high; with square corners and beveled edges, secured with exposed screws.

C. Straight Pull-Plate Door Pulls: 0.050-inch- thick plate, 4 inches wide by 16 inches high, with square corners and beveled edges; with minimum clearance of 1-1/2 inches from face of door; fastened at 8 inches o.c.

1. Type: 3/4-inch constant-diameter pull.
2. Mounting: Surface applied with concealed fasteners.
3. Overall Pull Length: 9 inches.

2.10 ACCESSORIES FOR PAIRS OF DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hager Companies.
2. National Guard Products.
3. Pemko Manufacturing Co.
4. Reese Enterprises.

B. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.

C. Flat Overlapping Astragals: BHMA A156.22; flat zinc-plated steel metal bar, surface mounted on face of door with screws; minimum 1/8 inch thick by 2 inches wide by full height of door.

2.11 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. LCN Closers; an Allegion Company; 4000 Series.
b. Norton Door Controls; an ASSA ABLOY Group company; PR7500/PR7700.

c. SARGENT Manufacturing Company; an ASSA ABLOY Group company; 351 Series.

B. Surface Closer with Cover: Grade 1; Modern Type with mechanism enclosed in cover.

1. Mounting: Parallel arm, unless otherwise indicated.
2. Type: Regular arm, heavy-duty.

a. Provide delayed action closing where indicated.

3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.

a. Where indicated, closer must operate at 180 degree opening.

4. Provide all drop plate brackets, shims and angle brackets as required to complete installation of closers on doors and frames.

2.12 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burns Manufacturing Incorporated.
b. Glynn-Johnson.
c. Hager Companies.
d. IVES Hardware.
e. Rockwood Manufacturing Company.
f. Trimco.

2. Provide wall stops for doors unless floor or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.

B. Wall Bumpers: Grade 1; with rubber bumper; 2-1/2-inch diameter, minimum 3/4-inch projection from wall; with backplate for concealed fastener installation; with concave bumper configuration.

C. Dome-Type Floor Stop: Grade 1; with minimum 1-inch- high bumper for doors without threshold and 1-3/8-inch- high bumper for doors with threshold; provide with extruded aluminum riser for carpet installations.

2.13 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

2.14 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hager Companies.
    b. National Guard Products.
    c. Pemko Manufacturing Co.
    d. Reese Enterprises.

2.15 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hager Companies.
    b. National Guard Products.
    c. Pemko Manufacturing Co.
    d. Reese Enterprises.

B. Saddle Thresholds:

1. Type: Fluted top.
2. Base Metal: Aluminum.

2.16 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Burns Manufacturing Incorporated.
    b. Hager Companies.
    c. IVES Hardware; an Ingersoll-Rand Company.
    d. Rockwood Manufacturing Company.
    e. Trimco.

B. Armor Plates: 36 inches high by door width, with allowance for frame stops.

C. Kick Plates: 12 inches high by door width, with allowance for frame stops.

D. Mop Plates: 6 inches high by 1 inch less than door width.

2.17 AUXILIARY DOOR HARDWARE

A. Silencers for Metal Door Frames: Grade 1; neoprene or rubber; minimum diameter 1/2 inch; fabricated for drilled-in application to frame.

2.18 AUXILIARY ELECTRIFIED DOOR HARDWARE

A. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; and listed and labeled for use with fire alarm systems.

B. Door and Frame Transfer Devices: Steel housing for mortise in hinge stile of door, with flexible tube for wiring bundle; accommodating doors that swing open to 120 degrees.

2.19 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

a. Wood or Machine Screws: For the following:

1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
2) Strike plates to frames.
3) Closers to doors and frames.

b. Steel Through Bolts: For the following unless door blocking is provided:

1) Surface hinges to doors.
2) Closers to doors and frames.
3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.20 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated on Drawings, and in accordance with the **New York** State Building Code, the 2010 ADA Standards and ICC/ANSI A117.1.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying schedule.
2. Furnish permanent cores to Owner for installation.

E. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

1. Configuration: Provide one power supply for each door opening.

F. Thresholds: Set thresholds for exterior doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

G. 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 will impede traffic.

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
2. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 087100

SECTION 087113 - AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Low-energy, power-operating door operators.

B. Related Sections include the following:

1. Division 08 Section "Door Hardware" for door hardware that must be coordinated with automatic door operator.
2. Division 08 Section “Aluminum-Framed Entrances and Storefronts” for entrance doors to receive door operators.
3. Division 26 Sections for electrical connections including conduit and wiring for automatic door operators.
4. Division 28 Sections for preparation for security systems.

1.3 DEFINITIONS

A. Activation Device: Device that, when actuated, sends electrical signal to automatic door operator to open door.

B. Safety Device: Device that prevents door from opening or closing.

1.4 REFERENCES

A. American National Standards Institute (ANSI) / Builders’ Hardware Manufacturer’s Association (BHMA).

1. ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors.
2. ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.

B. American Association of Automatic Door Manufacturers (AAADM).

1.5 PERFORMANCE REQUIREMENTS

A. General: Provide automatic door operators capable of withstanding structural loads and thermal movements based on testing manufacturer’s standard units in assemblies similar to those indicated for this Project.

B. Operating Range: Minus 30 deg F to 130 deg F.

C. Opening and Closing Forces: Not more than 15 lbf, 1 inch from the latch edge of the door.

1. Automatic door operators provided with a breakaway device shall require no more than 50 lbf applied at 1 inch from the latch edge of the door.

D. Door Energy: The kinetic energy of a door in motion shall not exceed 1.25 lbd-ft.

E. Closing Time:

1. Doors to be field adjusted to close from 90 degrees to 10 degrees in 3 seconds or longer.
2. Doors to be field adjusted to close from 10 degrees to fully closed in not less than 1.5 seconds.

1.6 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators and activation and safety devices.

B. Shop Drawings: Show fabrication and installation details for automatic door operators. Include locations and elevations of entrances showing activation and safety devices, and wiring for electrical supply.

C. Samples for Initial Selection: For each type of exposed component and door control indicated.

D. Samples for Verification: For exposed components and activation and safety devices with factory-applied color finishes.

E. Qualification Data: For manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

G. Operation and Maintenance Data: For automatic door operators to include in emergency, operation, and maintenance manuals.

H. Warranties: Special warranties specified in this Section.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Manufacturer Qualifications: Company certificate issued by AAADM.

C. Testing Agency Qualifications: An independent agency with inspector certified by AAADM.

D. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.

E. 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.

F. UL Standard: Comply with UL 325.

G. Power Operated Door Standard: ANSI/BHMA A156.19.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify door openings by field measurements before fabrication of exposed covers for automatic door operators and indicate measurements on Shop Drawings.

1.9 COORDINATION

A. Templates: Review Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to power supplies and security access control system.

C. System Integration: Integrate automatic door operators with other systems as required for a complete working installation.

1. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after the electric lock system is released.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty or sporadic operation of automatic door operator or activation and safety devices.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.

2. Warranty Period: One year from date of Substantial Completion.

1.11 MAINTENANCE SERVICE

A. Maintenance: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of automatic door operator Installer. Include quarterly planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1. Engage inspector certified by AAADM to perform safety inspection after each adjustment or repair and at end of maintenance period. Submit completed inspection form to Owner.
2. Perform maintenance, including emergency callback service, during normal working hours.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Subject to compliance with requirements, provide **Stanley Access Technologies; Magic-Force Series** or comparable product by one of the following:

1. Besam North America, an ASSA ABLOY company.
2. Horton Automatics.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with standards indicated below:

1. Sheet: ASTM B 209.
2. Extrusions: ASTM B 221, Alloy 6063-T6.

B. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2.3 AUTOMATIC DOOR OPERATORS, GENERAL

A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

B. Electromechanical Operating System: Unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, and with manual operation including spring closing with power off.

C. Exposed Cover: Fabricated from 0.125-inch- thick extruded aluminum; 6 inches square in section; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.

1. Finish: Clear anodized.

2.4 LOW-ENERGY, POWER-OPERATING DOOR OPERATORS

A. Standard: Comply with BHMA A156.19.

B. Performance Requirements:

1. Not more than 15 lbf 1 inch from latch edge of door to prevent stopped door from opening or closing.
2. If power fails, not more than 30 lbf 1 inch from latch edge of door to manually set door in motion.

C. Operation: Power opening and power-assisted spring closing.

1. Power-Assisted Opening: Power-assisted opening that reduces force to open self-closing door. Pushing or pulling on door activates automatic door operator.

2. Closing spring: Helical compression spring, adjustable for positive closing action, without removing the operator from the header.
3. Provide a rheostat module to allow for independent field adjustment of closing and latching speeds using the motor as a dynamic brake.
4. Provide a field adjustable open stop to accommodate opening angles from 80 to 135 degrees without the need for additional components.
5. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open, with a field adjustable force to accommodate on-site conditions.
6. Design operator to output audible noise ratios less than or equal to 50 dba.
7. Manual Use: The operator is to function as a manual door closer in the direction of swing with or without electrical power.
8. Electrical: 120 VAC, 10 amps.

D. Handing: Non-handed; no tools required to change handing.

E. Capacity: Rated for door panels weighing up to 350 lbs.

F. Operating System: Electromechanical.

G. Microprocessor Control Unit: Solid-state controls.

H. Features:

1. Adjustable opening and closing speed.
2. Adjustable opening and closing force.
3. Adjustable backcheck.
4. Adjustable hold-open time of not less than 0 to 30 seconds.
5. Reverse on obstruction.

I. Mounting: Surface.

2.5 ELECTRICAL CONTROLS

A. Electrical Control System: The electrical control system includes a microprocessor controller and position encoder. The encoder monitors revolutions of the operator shaft and sends signals to the microprocessor controller to define door position. Systems utilizing external magnets and magnetic switches are not acceptable.

1. Life Cycle Data Counter (LCD): Incorporate a non-resettable counter to track door operation cycles.
2. Controller Protection: Incorporate the following features to ensure trouble-free operation:

    a. Automatic reset upon power up.
    b. Fuse protection.
    c. Electronic surge protection.
    d. Internal power supply protection.

B. Program Dip Switches: Allow selection of change at the following parameters:

1. Carpet or timer logic.
2. Single or dual door.
3. Activation options.
4. Normal back check or large back check.
5. Push-to-open assist on/off.

C. Soft Start/Stop: Provide a “soft-start” “soft-stop” motor driving circuit for smooth reopening and recycling.

D. Emergency Breakout Switch: Provide a cam actuated emergency breakout switch to disconnect power to the motor when an in-swing door is manually pushed in the emergency out direction. The operator will then automatically reset and power will be resumed.

E. Control Switch: Equip each automatic door operator with a three-position function switch to control operation of the door; automatic, off, and hold-open.

2.6 ACTIVATION AND SAFETY DEVICES

A. Wall Push-Plate Switch: Manufacturer's standard door control switch; consisting of square, flat push plate; of material indicated; and actuator mounted in recessed junction box. Provide engraved message as indicated.

1. Interior push plates: Wall mounted in single or double gang electrical boxes and hardwired to door operator controls.
2. Exterior push plates: Wall mounted and hardwired to door operator controls.
3. Size: 4-1/2- inches square.
4. Material: Stainless steel.
5. Message: International symbol of accessibility and "Push to Open."

B. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.7 ACCESSORIES

A. Low-Energy Automatic Door Operator Signage: Comply with BHMA A156.19.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame supports, and other conditions affecting performance of automatic door operators.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.

B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install complete automatic door operator system, including activation and safety devices, control wiring, and remote power units.

B. Low-Energy Power Door Operator Installation Standard: Comply with BHMA A156.19 for installation.

1. Mounting: Install surface mounted hardware using concealed fasteners to greatest extent possible.
2. Set headers, arms, and linkages level and true to location with anchorage for permanent support.
3. Install sealant in accordance with Division 07 Section “Joint Sealants” to provide a weathertight installation.

C. Automatic Door Operators: Install door operator system, including control wiring, as follows:

1. Refer to Division 26 Sections for connection to electrical power distribution system.

D. Activation and Safety Devices: Install devices and wiring, including connections to automatic door operators, according to BHMA A156.10 and as follows:

1. Wall Switches: Provide push plates on both sides of each opening indicated to receive automatic door operators.

E. Connect wiring according to Division 26 Sections.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing and Inspecting: After installation has been completed, testing and inspecting of each automatic door operator shall be performed to verify compliance with applicable BHMA standards.

1. Inspection Report: Submit report in writing to Architect and Contractor within 24 hours after inspection.

C. Remove and replace automatic door operators where test results indicate they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

3.4 ADJUSTING

A. Adjust automatic door operators and activation and safety devices to operate smoothly, easily, and properly, and for safe operation and weathertight closure.

1. Adjust doors with low-energy door operators to close according to BHMA A156.19.

B. Lubricate operators, hardware, and other moving parts.

C. After completing installation of exposed, factory-finished automatic door operators, inspect exposed finishes and repair damaged finishes.

D. Readjust automatic door operators and activation and safety devices after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.

E. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose, without additional cost.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 087113

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Doors.
2. Glazed entrances.
3. Storefront and curtainwall framing.

B. Related Sections include the following:

1. Division 08 Section “Hollow Metal Doors and Frames” for installing glazing in hollow metal doors and frames.
2. Division 08 Section “Aluminum-Framed Entrances and Storefronts” for glazing to be furnished and installed with aluminum framing systems.
3. Division 08 Section “Glazed Aluminum Curtain Walls” for glazing to be furnished and installed with aluminum framing systems.

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: As indicated, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads", and the New York Island State Building Code.

1) Ultimate Design Wind Speed: 115 mph.

b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.

1) Load Duration: 3 seconds or less.

c. Thickness of Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. Center-of-Glass Values: Based on using LBL-35298 WINDOW 5.2 computer program for the following methodologies:

a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
b. Solar Heat Gain Coefficient: NFRC 200.
c. Solar Optical Properties: NFRC 300.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

1.6 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12-inch- square Samples for glass.

1. Fire-resistive (safety) glazing products.
2. Insulating glass for each designation indicated.

C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers.

B. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

C. Product Test Reports: For each of the following types of glazing products:

1. Coated float glass.
2. Insulating glass.
3. Glazing sealants.

D. Warranties: Special warranties specified in this Section.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, coated float glass, laminated glass, and insulating glass.

D. Source Limitations for Glass Sputter-Coated with Solar-Control Low-E Coatings: Where solar-control low-e coatings of a primary glass manufacturer that has established a certified fabricator program is specified, obtain sputter-coated solar-control low-e-coated glass in fabricated units from a manufacturer that is certified by coated-glass manufacturer.

E. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

F. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.

1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

G. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.

1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

H. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201**.**

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

I. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:

1. Insulating Glass Certification Council.

K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups in the location as directed by Architect.
2. Build glass mockups by installing the following kinds of glass in mockups specified in Division 08 Section "Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods:

   a. Coated insulating glass.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

L. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.11 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other uncoated glass).

C. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.

2.2 FIRE-RATED SAFETY GLAZING PRODUCTS

A. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252, including hose stream test.

B. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257, including hose stream test.

C. Laminated Ceramic Glazing (Fire Rated Safety Glazing): Proprietary Category II safety glazing product in the form of two lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch nominal thickness; polished on both surfaces, transparent; weighing 4 lb/sq. ft.; complying with testing requirements in 16 CFR 1201 for Category II materials, and as follows:

1. Fire-Protection Rating: 20, 45, 60 and 90 minutes as indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Visible Light Transmission: 80 percent minimum.
3. Products: Subject to compliance with requirements, provide one of the following:

    a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.
    b. SAFTI *FIRST*; Pyran Platinum L.
    c. Schott North America, Inc.; Pyran Platinum L.

2.3 INSULATING GLASS

A. Basis-of-Design Product: Subject to compliance with requirements, provide **Viracon, Inc.; VE 1-2M** or comparable product by one of the following:

1. Guardian Industries Corp; Sun-Guard.
2. PPG Industries, Inc.; Solarban 60.

B. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.

1. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
2. Sealing System: Dual seal, with primary and secondary sealants as follows:

    a. Polyisobutylene and silicone.

3. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:

    a. Spacer Material: Aluminum with mill or clear anodic finish.
    b. Desiccant: Molecular sieve or silica gel, or blend of both.

c. Corner Construction: Manufacturer's standard corner construction.

2.4 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Neutral-Curing Silicone Glazing Sealants:

a. Products:

1) Dow Corning Corporation; 791.
2) GE Silicones; SilPruf NB SCS9000.
3) Pecora Corporation; 895.

b. Type and Grade: S (single component) and NS (nonsag).
c. Class: 50.
d. Use Related to Exposure: NT (nontraffic).
e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.

1) Use O Glazing Substrates: Coated glass and aluminum coated with a high-performance coating.

C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.5 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:

1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.

4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.6 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 MONOLITHIC FLOAT-GLASS UNITS

A. **Glass Type A**: Clear fully tempered float glass.

1. Thickness: 6.0 mm (1/4 inch.).
2. Provide safety glazing labeling.

3.8 FIRE-RESISTANT GLAZING SCHEDULE

A. **Glass Type B**: 45-, 60-, or 90-minute fire-protection-rated glazing; laminated ceramic glazing.

3.9 INSULATING-GLASS UNITS

A. **Glass Types C**: Low-E Insulating-Glass Units for use in aluminum-framed entrances and storefront systems and glazed aluminum curtain walls.

1. Overall Unit Thickness and Thickness of Each Lite: 1-inch unit thickness and 1/4-inch each lite.
2. Interspace Content: Argon.
3. Outdoor Lite: Clear fully tempered float glass.
4. Indoor Lite: Clear fully tempered float glass.
5. Low-E Coating: Sputtered on second surface.
6. Visible Light Transmittance: 70 percent minimum.
7. Winter Nighttime U-Factor: 0.24 maximum.
8. Solar Heat Gain Coefficient: 0.38 maximum.
9. Provide safety glazing labeling.

END OF SECTION 088000

SECTION 088713 – GLAZING FILMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Decorative glazing films.

B. Related Sections:

1. Division 08 Section "Glazing" for standard glass products.

1.3 PERFORMANCE REQUIREMENTS

A. Fire Performance: Surface burning characteristics with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1.4 SUBMITTALS

A. Product Data: Submit product data for each product indicated.

B. Qualification Data: For qualified Installer.

C. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of film overlay to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer acceptable to the manufacturer.

B. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect materials according to manufacturer's written instructions and as needed to prevent damage to surfaces and edges.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install materials until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Field Measurements: Verify actual dimensions of openings and construction contiguous with glazing films by field measurements before fabrication.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace glazing films that deteriorate within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLAZING FILMS

A. Decorative Film (**FIL-001**): Gradient film with small dot pattern.

1. Product: Subject to compliance with requirements, provide the following, or equal:

a. 3M Fasara Glass Finishes; SH2FGAR Aerina.

2. Film Type: Polyester.
3. Thickness: 3.3 mils.
4. Roll Height: 50 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate conditions for existing substrates are acceptable for product installation in accordance with manufacturer’s instructions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install glazing films in accordance with manufacturer's written installation instructions.

3.3 CLEANING AND PROTECTION

A. Protect glazing films from damage immediately after installation by attaching crossed streamers to framing and held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088713

SECTION 092116 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Exterior non-load-bearing wall framing.
2. Non-load-bearing steel framing members for the following applications:

    a. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
    b. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

3. Interior gypsum board.
4. Exterior gypsum sheathing.

B. Related Sections include the following:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking built into gypsum board assemblies.
2. Division 07 Section "Thermal Insulation" for thermal and sound attenuation insulation installed in assemblies that incorporate gypsum board.
3. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board.
4. Division 09 Section “Tiling” for tile backing panels.
5. Division 09 Section “Painting” for primers applied to gypsum board surfaces.

C. Products installed, but not furnished, under this Section include the following:

1. Access doors and frames, furnished by Fire Protection, Plumbing, Mechanical, and Electrical Subcontractors in accordance with Division 08 Section “Access Doors and Frames.”

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide interior and exterior non-load-bearing metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: In accordance with the New York State Building Code and as indicated on Structural Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

    a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/600 of the wall height.

b. Interior Framing Systems:

1) Maximum Deflection: L/240 at 5 psf, stud spacing at 16 inches o.c.

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

a. Upward and downward movement of 3/4 inch.

5. Design jamb studs, jack studs cripple studs, sills and headers to support weight of wall components (dead load) and horizontal loads.

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."

1. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
2. Provide interior framing systems sized to accommodate maximum deflection using limiting heights of metal studs without contribution of gypsum wallboard (non-composite).

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1. For non-load-bearing metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.
2. Include calculations for span capabilities of cold-formed metal framing for deflection criteria specified.

C. Control Joint Locations: Submit plan with proposed locations of control joints for approval. Architect to provide final determination of all locations.

D. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

E. Welding certificates.

F. Qualification Data: For professional engineer.

G. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.

H. Research/Evaluation Reports: For cold-formed metal framing.

I. Warranty: Special warranty included in this Section.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of New York 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.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

F. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

G. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

H. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

   a. Each level of gypsum board finish indicated for use in exposed locations.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

C. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace exterior gypsum sheathing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COLD-FORMED STEEL FRAMING, GENERAL

A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:

1. ClarkDietrich Building Systems.
2. MarinoWare; a division of Ware Industries.
3. SCAFCO Steel Stud Company.

2.2 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Structural performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G90, hot-dip galvanized.

C. Steel Studs: ASTM C 645, manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As required by structural performance.
2. Flange Width: 1-5/8 inches.

D. Steel Track: ASTM C 645, manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As required by structural performance.
2. Flange Width: 1-1/4 inches.

E. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: As required by structural performance.
2. Flange Width: 1 inch plus the design gap for 1-story structures and 1 inch plus twice the design gap for other applications.

F. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, 20 gauge minimum but not less than that required to meet structural performance requirements, and depth required to fit insulation thickness indicated.

2.3 INTERIOR NON-LOAD-BEARING STEEL FRAMING

A. Interior Framing Members, General: Comply with ASTM C 645 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: Comply with ASTM C 645; roll-formed from hot-dipped galvanized steel; complying with ASTM A 1003/A 1003M and ASTM A 653/A 653M G40 or having a coating that provides equivalent corrosion resistance. A40 galvannealed products are not acceptable.

    a. Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authority having jurisdiction.

B. Steel Studs and Runners: ASTM C 645.

1. Non-Structural Studs: Cold-formed galvanized steel C-studs as per ASTM C 645 for conditions indicated below:

    a. Flange Size: 1-1/4-inch.
    b. Web Depth: As indicated on Drawings.

        1) Minimum Thickness: 0.033 inch.
        2) Minimum Design Thickness: 0.0346 inch.

C. Slip-Type Head Joints: Where indicated, provide the following:

1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ClarkDietrich Building Systems; BlazeFrame.
b. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Posi Clips.
c. Metal-Lite, Inc.; The System.
d. Sliptrack Systems; SLP-TRK.

2.4 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

a. Type: Postinstalled, expansion anchor.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.

D. Carrying Channels: Cold-rolled, 16 gauge, commercial-steel sheet with minimum 1/2-inch- wide flanges.

1. Depth: 1-1/2 inches.

E. Furring Channels (Furring Members): Cold-Rolled Channels: 16 gauge, with minimum 1/2-inch- wide flanges, 3/4 inch deep.

F. Grid Suspension System for Ceilings: ASTM C 645, direct-hung, double-web suspension system composed of main beams and cross-furring members that interlock.

1. Furring Runners: Manufactured from 0.020 inch thick steel, 1-1/2-inches wide by 1-1/2- inches high.
2. Furring Tees: Manufactured from 0.020 inch thick steel, 1-1/2-inches wide by 1-1/2- inches high with staked-on clip couplings, factory punched cross tee slots, and hanger holes.

3. Products: Subject to compliance with requirements, provide one of the following:

    a. Armstrong World Industries, Inc.; Drywall Grid Systems.
    b. CertainTeed Corporation; 1-1/2" Drywall Suspension System.
    c. Rockfon; Chicago Metallic 660 Drywall Grid System.
    d. USG Corporation; Drywall Suspension System.

2.5 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36 or ASTM C 1396, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed.
    b. Continental Building Products.
    c. G-P Gypsum.
    d. National Gypsum Company.
    e. USG Corporation.

B. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

C. Type X:

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

D. Abuse-Resistant and Moisture- and Mold-Resistant Gypsum Board: Manufactured to produce greater resistance to surface indentation and abrasion than standard, regular-type and Type X gypsum board.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10.
4. Abuse-Resistant Performance: Comply with ASTM C 1629 and the following:

    a. Surface Abrasion: ASTM D 4977 modified with 25 lbs of additional weight, 0.059" maximum (Level 2 minimum).
    b. Surface Indentation: ASTM D 5420, 0.10" maximum (Level 1).
    c. Soft-Body Impact: ASTM E 695, surface failure at 195 ft.-lbs minimum (Level 2).
    d. Hard-Body Impact: ASTM E 1629 Annex A.1, surface failure at 50 ft.-lbs minimum (Level 1).

5. Products: Subject to compliance with requirements, provide one of the following:

    a. CertainTeed; AirRenew Extreme Abuse Resistant Gypsum Board.
    b. Continental Building Products; Protecta AR 100.
    c. National Gypsum Company; Gold Bond Hi-Abuse Brand XP Gypsum Board.
    d. USG Corporation; Mold Tough AR Panels.

2.6 EXTERIOR SHEATHING

A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177.

1. Product: Subject to compliance with requirements, provide one of the following:

a. CertainTeed; GlasRoc Sheathing.
b. Continental Building Products; Weather Defense Platinum Sheathing.
c. G-P Gypsum Corporation; Dens-Glass Fireguard Sheathing.
d. National Gypsum; Gold Bond Brand e²XP Sheathing.
e. USG Corporation; Securock Glass-Mat Sheathing Panels.

2. Type and Thickness: Type X, 5/8 inch thick.

B. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

2.7 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. U-Bead: J-shaped; exposed short flange does not receive joint compound.
d. Expansion (control) joint.

2.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.9 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Sound Attenuation Blankets: As specified in Division 07 Section “Thermal Insulation.”

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

C. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

D. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

E. Isolation Strip at Exterior Walls: Provide one of the following:

1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

2.10 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

C. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of areas and substrates.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.4 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

1. Space studs for all applications at 16 inches o.c., unless otherwise indicated.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb, unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, and to bottom track only where deflection track is indicated. Space studs as follows:

1. Stud Spacing: 16 inches o.c.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single-leg deflection tracks and anchor to building structure, where indicated.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

a. Install solid blocking at 96-inch centers.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.6 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.7 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: Ceilings and soffits.
2. Abuse-Resistant Type: Typcial, at walls.
3. Tile Backing Panels: Wall locations to receive tile, specified in Division 09 Section “Tiling.”

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels either vertically (parallel to framing) or horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.8 GYPSUM SHEATHING INSTALLATION, GENERAL

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

B. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

C. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

D. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

E. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.9 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.10 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal exterior gypsum sheathing joints according to sheathing manufacturer's written instructions and to comply with Division 07 Section “Water Resistive Membrane Air Barriers” for exterior gypsum sheathing to receive membrane air barrier.

1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.11 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings, or if not indicated, according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

3.12 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

3.13 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092116

SECTION 093100 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Quarry tile.
2. Ceramic wall tile.
3. Porcelain wall tile.
4. Tile backing panels.
5. Crack-suppression membrane for thin-set tile installations.
6. Metal edge strips installed as part of tile installations.

B. Related Sections include the following:

1. Division 02 Section “Selective Demolition” for removal of existing flooring materials.
2. Division 03 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
3. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

D. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 PERFORMANCE REQUIREMENTS

A. Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per the DCOF AcuTest in accordance with ANSI A137.1 – 2012 standard.

1. Level Surfaces: Minimum 0.42 wet.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory for each color and finish required.
3. Metal edge strips in 6-inch lengths.

1.7 INFORMATIONAL SUBMITTALS

A. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

B. Product Certificates: For each type of product, signed by product manufacturer.

C. Qualification Data: For Installer.

D. Material Test Reports: For each tile-setting and -grouting product.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

1.9 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.

3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Preconstruction Testing Services: Engage a qualified independent testing agency to perform moisture vapor emission testing on existing slabs, indicated below.

1. ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
2. ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes.

a. Test floor following installation of floor leveling compounds in accordance with ASTM F 2170. Do not test leveling compound surface for moisture or pH level.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.11 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.

1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:

1. Tile backing panels.
2. Crack isolation membrane.
3. Metal edge strips.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

C. ISO 13007 Standards for Ceramic Tile, Adhesives and Grouts.

D. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. As indicated by manufacturer's designations.

E. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.3 TILE PRODUCTS

A. Quarry Tile (**TIL-001**): Flat tile as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Daltile; Quarry Textures,** or a comparable product by the following:

   a. American Olean.
   b. Summitville.

2. Facial Dimensions: 6 by 6 inches.
3. Thickness: 1/2 inch.
4. Wearing Surface: Nonabrasive, smooth.
5. Finish: Matte.
6. Color: As indicated on Finish Material List.
7. Grout Color: As indicated on Finish Material List.

8. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes and colors:

    a. Base: A-3565, coved with surface bullnose top edge, face size 5 by 6 inches.
    b. Cove Base Inside Corner: QB-3565, 1 by 5 inches.
    c. Cove Base Outside Corner: QCRL-3565, 5 by 6 inches.

B. Ceramic Wall Tile (**TIL-002A, 002B**): Flat tile as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Daltile; Modern Dimensions,** or a comparable product by the following:

    a. American Olean.
    b. Crossville.

2. Module Sizes: 4-1/4 by 12-7/8 inches.
3. Thickness: 5/16 inch.
4. Face: Plain with cushion edges.
5. Finish: Semi-gloss.
6. Colors: As indicated on Finish Material List.
7. Grout Color: As indicated on Finish Material List.

C. Ceramic Wall Tile (**TIL-003**): Flat tile as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Daltile; Florentine,** or a comparable product by the following:

    a. American Olean.
    b. Crossville.

2. Module Sizes: 12 by 24 inches.
3. Thickness: 3/8 inch.
4. Face: Plain with cushion edges.
5. Finish: Gloss.
6. Color: As indicated on Finish Material List.
7. Grout Color: As indicated on Finish Material List.

D. Porcelain Wall Tile (**TIL-004**): Flat tile as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Daltile; Valor,** or a comparable product by the following:

    a. American Olean.
    b. Crossville.

2. Module Sizes: 12 by 24 inches.
3. Thickness: 3/8 inch.
4. Face: Plain with cushion edges.
5. Finish: Natural.
6. Color: As indicated on Finish Material List.
7. Grout Color: As indicated on Finish Material List.

E. Porcelain Wall Tile (**TIL-005, 006, 008, 009**): Flat tile as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Stone Source; Mutina Azulej** or equal.

2. Module Sizes: 8 by 8 inches.
3. Thickness: 10 mm.
4. Face: Plain with cushion edges.
5. Finish: Matte.
6. Colors: As indicated on Finish Material List.
7. Grout Color: As indicated on Finish Material List.

F. Ceramic Wall Tile (**TIL-007**): Flat tile as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Fireclay Tile; Vintage Leather** or equal.

2. Module Sizes: 3 by 3 inches.
3. Thickness: 5/16 inch.
4. Face: Plain with cushion edges.
5. Finish: Matte.
6. Colors: As indicated on Finish Material List.
7. Grout Color: As indicated on Finish Material List.

2.4 CRACK-SUPPRESSION MEMBRANES FOR THIN-SET TILE INSTALLATIONS

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Product: System consisting of liquid-latex rubber and fabric reinforcement.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Custom Building Products; Custom 9240 Waterproofing and Anti-Fracture Membrane.
   b. Laticrete International, Inc.; Laticrete 9235 Waterproof Membrane.
   c. MAPEI Corporation; Mapelastic AquaDefense.

2.5 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. National Gypsum; PermaBase Cement Board.
   b. USG Corporation; DUROCK Cement Board.

2. Thickness: 5/8 inch.

2.6 SETTING AND GROUTING MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Custom Building Products.
2. LATICRETE International Inc.
3. MAPEI Corporation.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4 and ISO 13007 C2EP1, consisting of the following:

1. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.

a. Product: Subject to compliance with requirements, provide one of the following:

1) Custom Building Products; Versa Bond.
2) LATICRETE International, Inc.; 253 Gold.
3) MAPEI Corporation; Ultraflex 2.

2. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4 and ISO 13007 C2TES1.

a. Product: Subject to compliance with requirements, provide one of the following, or equal:

1) Custom Building Products; LFT.
2) MAPEI Corporation; Ultraflex LFT.

C. Epoxy Based Tile Grout: ANSI A118.3, color as selected by Architect from manufacturer’s full range.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Custom Building Products; Ceg-Lite.
b. LATICRETE International Inc.; Laticrete SpectraLOCK Pro.
c. MAPEI Corporation; MAPEI Kerapoxy CQ.

D. Industrial Grade Epoxy Based Tile Grout: ANSI A118.3, color as selected by Architect from manufacturer’s full range. For use in food service/kitchen areas.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Custom Building Products; Ceg-IG.
b. LATICRETE International Inc.; Laticrete SpectraLOCK 2000 IG.
c. MAPEI Corporation; MAPEI Kerapoxy IEG CQ.

2.7 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 07 Section "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic, designed specifically for flooring and wall applications, exposed-edge material as indicated.

1. Basis of Design Products: Provide products indicated by **Schluter Systems**, or equal.
2. Provide the following metal edge strips at all conditions indicated:

a. Quarry tile to resilient:

1) Schlüter-RENO-U, stainless steel.

a) Height: As required to suit tile thickness.

b. Tile to concrete:

1) Schlüter-RENO-RAMP, stainless steel.

a) Height: As required to suit tile thickness.

C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.9 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
4. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
5. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors installed with thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.

1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION, GENERAL

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

E. Lay out tile wainscots to next full tile beyond dimensions indicated.

F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.
2. Comply with requirements in TCNA EJ171.
3. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

G. Grout tile to comply with requirements of the following tile installation standards:

1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

3.4 TILE BACKING PANEL INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 CRACK-SUPPRESSION MEMBRANE INSTALLATION

A. Install crack-suppression membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.

3.6 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.

B. Joint Widths: Install tile on floors with the following joint widths.

1. Quarry Tile: 1/4 inch.

C. Metal Edge Strips: Install at locations indicated, and where exposed edge of tile flooring meets other flooring that finishes flush with top of tile.

3.7 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

B. Joint Widths: Install tile on walls with the following joint widths:

1. Wall Tile: 1/16 inch.

3.8 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

D. Protect all installed floor tile work with heavy duty kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

1. Remove coverings at Substantial Completion for final review by Architect. Reinstall protective coverings following review and correction of punch list items as required.

3.9 FLOOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Quarry Tile Installation: TCNA F125A; interior floor installation on crack-suppression membrane over concrete; thin-set mortar.

a. Tile Type: Quarry Tile.
a. Thin-Set Mortar: Latex-portland cement mortar.
b. Grout: Chemical resistant furan grout.

3.10 WALL TILE INSTALLATION SCHEDULE

A. Interior Wall Installations, Metal Studs:

1. Tile Installation: TCNA W244C; thinset mortar on cementitious backer units.

a. Tile Type: Porcelain and ceramic wall tile.
b. Thin-Set Mortar: Latex-portland cement mortar.
c. Grout: Epoxy based grout.

END OF SECTION 093100

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Acoustical panels and exposed suspension systems for ceilings.

B. Related Sections include the following:

1. Division 07 Section “Joint Sealants” for acoustical sealants furnished and installed by this Section in acoustical panel ceiling assemblies.
2. Division 09 Section “Gypsum Board Assemblies” for drywall suspension system for suspended gypsum board ceilings.

1.3 DEFINITIONS

A. CAC: Ceiling Attenuation Class.

B. LR: Light Reflectance coefficient.

C. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
4. Minimum Drawing Scale: 1/8 inch = 1 foot.

C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.

2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.

E. Research/Evaluation Reports: For each acoustical panel ceiling and components.

F. Maintenance Data: For finishes to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and partition assemblies.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed, for each ceiling panel type.
2. Suspension System Components: Quantity of each exposed component equal to 2 percent of quantity installed, for each suspension system type.

1.10 WARRANTY

A. Special Warranty for Acoustical Panel Ceilings and Suspension Systems: Manufacturer's standard form in which manufacturer agrees to replace acoustical panel ceilings and suspension systems that fail in materials or workmanship within specified warranty period.

1. Failure of ceiling panels includes sagging and warping, and growth of mold, mildew and stain causing bacteria.
2. Failure of suspension systems includes rusting.
3. Warranty does not cover damages that may occur from vibrations, fire, water, freezing temperatures, accident or any form of abuse or exposure to abnormal conditions.
4. Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and the New York State Building Code.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 450 or less.

2.2 ACOUSTICAL PANELS, GENERAL

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

D. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide products as indicated by **Armstrong World Industries, Inc.** or a comparable product by one of the following:

1. CertainTeed, Inc.
2. USG Interiors, Inc.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Ceiling Type CLG-01:

a. Basis of Design Product: **Armstrong World Industries, Inc.; Fine Fissured #1728.**

1) Type and Form: Type IV, mineral base with membrane-faced overlay; Form 1, nodular; with glass-fiber cloth overlay.
2) Pattern: E (lightly textured)
3) Color: Tech Black.
4) NRC: Not less than 0.55.
5) CAC: Not less than 35.
6) Edge/Joint Detail: Square.
7) Thickness: 5/8 inch.
8) Modular Sizes: 24 x 24 inches.
9) Antimicrobial Treatment: BioBlock + and HumiGuard Plus.

2. Ceiling Type CLG-02:

a. Basis of Design Product: **Armstrong World Industries, Inc.; Ultima Health Zone #1935.**

1) Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with acoustically transparent membrane.
2) Pattern: E (lightly textured)
3) Color: White.
4) LR: Not less than 0.86.
5) NRC: Not less than 0.70.
6) CAC: Not less than 38.
7) Edge/Joint Detail: Square.
8) Thickness: 3/4 inch.
9) Modular Size: 24 x 24 inches.
10) Antimicrobial Treatment: BioBlock + and HumiGuard Plus.

3. Ceiling Feature:

a. Basis of Design Product: **Armstrong World Industries, Inc.; MetalWorks Blades – Classics.**

1) Size: Vertical panel with end caps at ends of rows; 4” wide by 1” thick, various lengths as indicated.
2) Perforation: M1 Unperforated.
3) Color: Effects Maple.
4) Provide attachment clips and alignment devices for a complete system installation.

C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, G30 coating designation, with prefinished, cold-rolled, 15/16-inch- wide, metal caps on flanges.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Armstrong World Industries, Inc.; Prelude XL 15/16" Exposed Tee System** or a comparable product by one of the following:

    a. CertainTeed; 15/16" Classic Stab System.
    b. USG Interiors, Inc.; Donn DX/DXL.

2. Structural Classification: Intermediate duty system.
3. Face Design: Flat, flush.
4. Face Finish: White.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Products: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. CertainTeed.
3. USG Interiors, Inc.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.

2.7 ACOUSTICAL SEALANT

A. Products: Comply with Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

    a. Install moldings in one piece at all walls 12 feet or less in length. Minimize quantity of pieces at longer walls.
    b. Use factory edges where joining lengths of molding. Abut moldings where joined; do not overlap.

3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.

3.4 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.

B. Related Sections:

1. Division 09 Section "Resilient Tile Flooring" for resilient tile flooring and flooring preparation requirements.
2. Division 09 Section "Tile Carpeting."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to flooring installation including, but not limited to, the following:

1. Review substrate conditions, moisture and pH test results, manufacturer's installation instructions, and warranty requirements.
2. Document proceedings, including required corrective measures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 percent (50 linear feet for every 500 linear feet) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.8 WARRANTY

A. General Warranty: Special warranties specified in this Section shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Limited Warranty: Written warranty, signed by manufacturer agreeing to repair or replace resilient flooring, installed according to manufacturer’s written recommendations, that fails in performance, materials, or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base: ASTM F 1861.

1. Basis-of-Design Product (**CVB-001**): Subject to compliance with requirements, provide **Johnsonite; Rubber Wall Base** or a comparable product by one of the following:

a. Mannington; Premium Edge.
b. Roppe Corporation, 700 Series Base.

2. Resilient Base Standard: ASTM F 1861.

a. Material Requirement: Type TP (rubber, thermoplastic).
b. Manufacturing Method: Group I (solid, homogeneous).
c. Style and Location: Style B, Cove.

3. Minimum Thickness: 0.125 inch.
4. Height: 4 inches.
5. Lengths: Coils in manufacturer's standard length.
6. Inside and Outside Corners: Job formed.
7. Colors: As indicated on Finish Legend.

2.2 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. Preformed Corners: Install preformed corners before installing straight pieces.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Luxury vinyl tile.
2. Floor preparation requirements.

B. Related Sections:

1. Division 02 Section “Selective Demolition” for removal of existing floor finishes.
2. Division 03 Section “Concrete Moisture Vapor Reduction Admixture” for integral waterproofing installed in new concrete slabs.
3. Division 03 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for substrates.
4. Division 09 Section "Resilient Base and Accessories" for resilient base and reducer strips installed with resilient floor coverings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples for Initial Selection: For each type of floor tile indicated.

D. Samples for Verification: Full-size units of each color and pattern of floor tile required.

E. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

B. Warranty: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required. Provide one Master Installer for each product specified.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups for each type of floor tile including resilient base and accessories.

a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preconstruction Testing Service: Moisture testing on new concrete slabs on grade to be performed by manufacturer of moisture vapor reduction admixture in accordance with Division 03 Section “Concrete Moisture Vapor Reduction Admixture.”

D. Preconstruction Testing Service: Engage a qualified independent testing agency to perform testing indicated below.

1. ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes.
2. ASTM F 3191, Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to flooring installation including, but not limited to, the following:

1. Review substrate conditions, moisture and pH test results, manufacturer’s installation instructions, and warranty requirements.
2. Document proceedings, including required corrective measures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F , in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install resilient products after other finishing operations, including painting, have been completed.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.10 WARRANTY

A. General Warranty: Special warranties specified in this Section shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer Warranty: Written warranty, signed by manufacturer agreeing to repair or replace resilient flooring and adhesives that fails in performance, materials, or workmanship within specified warranty period.

1. Warranty Period: Commencing from date of Substantial Completion:

a. Luxury Vinyl Tile: 20 years.

2. Exclusions from warranty include the following:

a. Problems caused by moisture, hydrostatic pressure, or alkali in the subfloor.
b. Damage to flooring products from high heels or spiked shoes.

C. Installer Warranty: Written warranty, signed by Installer agreeing to repair or replace resilient flooring, installed according to manufacturer’s written recommendations, that fails in performance, materials, or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.
2. Exclusions from warranty include the following:

a. Problems caused by moisture, hydrostatic pressure, or alkali in the subfloor.

b. Damage to flooring products from high heels or spiked shoes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 LUXURY VINYL TILE

A. Vinyl Plank:

1. Basis of Design Product (**LVT-001,002**): Subject to compliance with requirements, provide the following, or equal:

a. Mannington Commercial; Amtico Wood.

2. Tile Standard: ASTM F 1700.

a. Type: B, Embossed Surface.
b. Class: III Printed Film Vinyl Tile.

3. Thickness: 0.098 inch (2.5 mm).
4. Wear Layer: 40 mil (1 mm).
5. Static Load Limit: ASTM F 970, 1000 psi.
6. Size: 6” x 36”.
7. Colors: As indicated on Finish Material List.

B. Vinyl Tile:

1. Basis of Design Product (**LVT-003**): Subject to compliance with requirements, provide the following, or equal:

a. Mannington Commercial; Amtico Abstract.

2. Tile Standard: ASTM F 1700.

a. Type: B, Embossed Surface.
b. Class: III Printed Film Vinyl Tile.

3. Thickness: 0.098 inch (2.5 mm).
4. Wear Layer: 40 mil (1 mm).
5. Static Load Limit: ASTM F 970, 1000 psi.
6. Size: 18” x 18”.
7. Colors: As indicated on Finish Material List.

2.3 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content:

a. Vinyl Tile Adhesives: 50 g/L or less.

2.4 SUBSTRATE PREPARATION

A. Primer: ASTM C1059, Type I, latex formulation for use with underlayments.

1. Product: Subject to compliance with requirements, provide one of the following:

a. Ardex; P 51 Primer.
b. Laticrete; Admix & Primer for underlayments.
c. MAPEI Corporation; Primer T for underlayments.

B. Underlayment: ASTM A118.4, 5000 psi compressive strength at 28 days; trowel applied cementitious underlayment for filling holes, depressions, and damaged areas of concrete slabs in excess of 1/2-inch depth.

1. Product: Subject to compliance with requirements, provide one of the following:

a. Ardex; SD-P.
b. Laticrete; 816 Latipatch Rapid Underlayment.
c. MAPEI Corporation; Planipatch.

C. Self-Leveling Underlayment: ASTM C109, 4300 psi compressive strength at 28 days; cementitious powder mixed with water to produce a free-flowing self-leveling underlayment for rapid leveling of concrete slabs that have been shot-blasted and/or with depressions of up to 1-inch depth.

1. Product: Subject to compliance with requirements, provide one of the following:

a. Ardex; K 15.
b. Laticrete; 86 LatiLevel Self Leveling Underlayment.
c. MAPEI Corporation; Ultraplan 1 Plus.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION FOR NEW CONCRETE SLABS

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform relative humidity test using in situ probes, in accordance with ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement, or up to the manufacturer's allowed limit for the installed products.
    b. Concrete slab substrates for testing should be at service temperature and relative humidity expected during normal use or at the conditions required for installation of a floor covering material in accordance with manufacturer's written installation instructions for at least 48 hours before making relative humidity measurements.
    c. Perform three tests for the first 1,000 square feet and at least one additional test for each additional 1,000 square feet.

5. Porosity Testing: Perform tests as follows prior to installation of flooring.

    a. Perform water absorption testing in accordance with ASTM F 3191 to determine if the substrate surface is porous or non-porous.
    b. Substrate and ambient temperature: 75 +/- 10 degrees F.
    c. Ambient humidity: 50 +/- 10 percent relative humidity.

6. Moisture testing for new concrete slabs on grade that contain integral waterproofing in accordance with Division 03 Section "Concrete Moisture Vapor Reduction System."

    a. Drilled sample cores of concrete slabs on grade will be tested for permeability and test results provided by the integral waterproofing manufacturer.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound ("underlayment") and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 PREPARATION FOR EXISTING CONCRETE SLABS

A. Prepare existing substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

C. Prime all existing concrete surfaces. Allow primer to dry for 2 to 3 hours at 70 deg F, but not more than 24 hours before installation of underlayment. Areas of primer that have dried for more than 24 hours must be re-primed prior to application of underlayment. Comply with manufacturer's written recommendations and the following:

1. Primer: Pour, mop or spray primer onto the surface. Apply an even thickness of primer to the prepared substrate using a bristle broom. Remove any puddles or thick areas.
2. Underlayment: Apply underlayment to existing holes, depressions, and cracks in substrate as required for preparation of installation of self-leveling underlayment.
3. Self-Leveling Underlayment: Prime surface and install self-leveling underlayment within 24 hours. Pour or pump self-leveling underlayment over the primed substrate and spread with a spike roller or gauging rake. Use a smoothing paddle to combine pours and to obtain a flat smooth surface.

    a. Furnish and install self-leveling underlayment on all existing slabs to receive new flooring, including those that have had existing VAT, VCT and/or mastic removed by the shot-blast method.

        1) Floor preparation work includes installation of underlayment as required and self-leveling underlayment in 1/4-inch thickness, unless otherwise indicated.
        2) Additional floor preparation work required in excess of 1/4-inch thickness for self-leveling underlayment, will be included in a Unit Price.

D. Test concrete slabs for moisture following installation of underlayment(s), but do not test surface of self-leveling underlayment for moisture or pH.

1. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
2. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform relative humidity test using in situ probes, in accordance with ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement, or up to the manufacturer's allowed limit for the installed products.
    b. Concrete slab substrates for testing should be at service temperature and relative humidity expected during normal use or at the conditions required for installation of a floor covering material in accordance with manufacturer's written installation instructions for at least 48 hours before making relative humidity measurements.
    c. Perform three tests for the first 1,000 square feet and at least one additional test for each additional 1,000 square feet.

3. Porosity Testing: Perform tests as follows prior to installation of flooring.

    a. Perform water absorption testing in accordance with ASTM F 3191 to determine if the substrate surface is porous or non-porous.
    b. Substrate and ambient temperature: 75 +/- 10 degrees F.
    c. Ambient humidity: 50 +/- 10 percent relative humidity.

E. Do not install floor tiles until they are same temperature as space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.4 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

1. Installation is not to be begin until the HVAC system is operational, and the following conditions are maintained for at least 48 hours before, during and 72 hours after completion:

    a. Ambient Temperature: Between 65 and 85 degrees F, unless otherwise stated by installed products manufacturer.
    b. Ambient Humidity: Between 35 and 55 percent, unless otherwise stated by installed products manufacturer.
    c. Substrate Temperature: Not less than 65 degrees F or more than 85 degrees F before, during and after installation, unless otherwise stated by installed products manufacturer.

        1) Do not install flooring unless substrate temperature is at least 5 degrees above dew point with temperature rising.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay vinyl tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
2. Lay vinyl planks in staggered rows.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Patterns: Install patterns in solid vinyl tile flooring as indicated. Waterjet cut all patterns and numerals prior to installation.

H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096723 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes:

1. High-performance resinous flooring systems.
2. Metal edge strips.
3. Floor preparation.

B. Related Sections include the following:

1. Division 02 Section “Selective Demolition” for removal of existing floor coverings.
2. Division 07 Section "Joint Sealants" for sealants installed at joints in resinous flooring systems.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

B. Samples for Initial Selection: For each type of exposed finish required.

C. Samples for Verification: For each resinous flooring system required, 6 inches square, applied to a rigid backing by Installer for this Project.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

E. Material Test Reports: For each resinous flooring component.

F. Material Certificates: For each resinous flooring component, signed by manufacturer.

G. Maintenance Data: For resinous flooring to include in maintenance manuals.

H. Warranty: Special warranty included in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.

1. Engage an installer who employs only persons trained and approved by resinous flooring manufacturer for applying resinous flooring systems indicated.
2. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

B. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Apply full-thickness mockups on 48-inch- square floor area selected by Architect.

a. Include 48-inch length of integral cove base.

2. Simulate finished lighting conditions for Architect's review of mockups.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preconstruction Testing Service: Engage a qualified independent testing agency to perform testing indicated below.

1. ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes.
2. ASTM F 3191, Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.

D. Preinstallation Conference: Prior to installation of resinous flooring, conduct preinstallation meeting at Project site in accordance with Division 01 Section “Project Management and Coordination.”

1. Review substrate conditions, moisture testing reports, manufacturer’s installation instructions, and warranty requirements.
2. Document proceedings, including corrective measures or actions required, and furnish copy to each participant.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

B. Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Section shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Limited Warranty: Written warranty, signed by manufacturer agreeing to repair or replace resinous flooring, installed according to manufacturer's written recommendations, that fails in performance, materials, or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.
2. Exclusions from warranty include the following:

a. Problems caused by moisture, hydrostatic pressure, or alkali in the subfloor.
b. Damage to flooring products from high heels or spiked shoes.

PART 2 - PRODUCTS

2.1 RESINOUS FLOORING, GENERAL

A. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

B. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested according to ASTM C 267 for immersion in the following reagents for not less than 7 days:

1. Acetic Acid 5 percent
2. Acetone
3. Amonimum Hydroxide 10 percent
4. Citric Acid 10 percent
5. Cola
6. Ethylene Glycol
7. Formaldehyde 10 percent
8. Gasoline
9. Hydrochloric Acid 10 percent and 20 percent
10. Lactic Acid 10-50 percent
11. Mineral Spirits
12. Nitric Acid 10 percent
13. Phosphoric Acid 10-80 percent
14. Salad Oil
15. Sodium Carbonate 2 percent and 20 percent
16. Sodium Chloride 10 percent
17. Syrup
18. Urine

19. Xylene

2.2 RESINOUS FLOORING

A. Basis of Design Product (**SEF-001**): Subject to compliance with requirements, provide the following:

1. **Stonhard; Stoneclad UT**.

B. System Characteristics: Resinous flooring system with urethane body.

1. Color: As indicated on Finish Material List.
2. Wearing Surface: Light texture.
3. Integral Cove Base: 4 inches high.
4. Overall System Thickness: 3/16 inch to 1/4 inch.

C. System Components:

1. Mortar:

a. Material design basis: Stonclad UT
b. Resin: Urethane.
c. Formulation Description: (4) four-component, 100 percent solids.
d. Application Method: Screed, Trowel.

1) Thickness of Coats: 3/16".
2) Number of Coats: One.
3) Broadcast texture into wet mortar base.

e. Aggregates: Pigmented Blended aggregate.

2. Top coat:

a. Material design basis: UT Sealer
b. Resin: Urethane.
c. Formulation Description: (2) two-component, 100 percent solids.
d. Type: pigmented.
e. Finish: standard.
f. Number of Coats: One.

D. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

1. Compressive Strength: 7,700 psi after 7 days per ASTM C 579.
2. Tensile Strength: 1,000 psi per ASTM C 307.
3. Flexural Strength: 2,400 psi per ASTM C 580.
4. Water Absorption: < 1% per ASTM C 413.
5. Impact Resistance: > 160 in. lbs. per ASTM D 2794.
6. Flammability: Class 1 per ASTM E-648.
7. Hardness: 80 to 84, Shore D per ASTM D 2240.

2.3 ACCESSORY MATERIALS

A. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.

B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

C. Metal Edge Strips: Height to match flooring and setting-bed thickness, metallic, designed specifically for flooring applications, exposed-edge material as indicated.

1. Basis of Design Product: Subject to compliance with requirements, provide the following:

a. **Schluter Systems; RENO RAMP**.

2. Finish: Satin Anodized Aluminum.
3. Thickness: To match flooring thickness.
4. Transition: Resinous to concrete, and resinous to resilient.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Roughen new concrete substrates as follows:

a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
b. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.

2. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 to 5 lb. of water/1000 sq. ft. in 24 hours, as required by manufacturer’s written recommendation for maximum moisture content.
b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

3. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

3.2 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.

    a. Apply joint sealant to comply with manufacturer's written recommendations.

B. Resinous Flooring:

1. Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates. Coordinate timing of primer application with application of troweled mortar to ensure optimum adhesion between resinous flooring materials and substrate.
2. Troweled Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate using manufacturer's specially designed screed rake adjusted to manufacturer's recommended height. Hand trowel apply mixed material over freshly primed substrate using steel finishing trowels or power trowel material using manufacturer's specially designed power trowel blades.
3. Finish Sealer: Remove surface irregularities and unbonded granules by lightly grinding and vacuuming the floor surface. Mix and apply sealer with strict adherence to manufacturer's installation procedures.

C. Integral Cove Base: Apply cove base mix, 4 inches high, to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.

3.3 CLEANING AND PROTECTING

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 096723

SECTION 096813 –TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Modular carpet tile entrance mats.

B. Related Sections include the following:

1. Division 02 Section “Selective Demolition” for removal of existing floor finishes.
2. Division 03 Section “Concrete Moisture Vapor Reduction Admixture” for integral waterproofing installed in new concrete slabs.
3. Division 03 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for substrates.
4. Division 09 Section “Resilient Tile Flooring” for underlayment and floor preparation requirements.
5. Division 09 Section "Resilient Base and Accessories" for resilient wall base and molding accessories installed with carpet tile.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.

B. Shop Drawings: Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

E. Qualification Data: For Installer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.

G. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

H. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

C. Mockups: Before installing carpet tile, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

D. Preconstruction Testing Service: Engage a qualified independent testing agency to perform testing indicated below.

1. ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes.
2. ASTM F 3191, Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.

E. Preconstruction Testing Service: Moisture testing on new concrete slabs on grade to be performed by manufacturer of moisture vapor reduction admixture in accordance with Division 03 Section “Concrete Moisture Vapor Reduction Admixture.”

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to carpet tile installation including, but not limited to, the following:

1. Review delivery, storage, and handling procedures.
2. Review ambient conditions and ventilation procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

B. Indoor Air Quality Management Plan: The following practices shall be implemented in accordance with the Construction Indoor Air Quality Management Plan as required in Division 01 Section “Indoor Air Quality Requirements.”

1. Carpeting to be stored per manufacturer’s recommendations for allowable temperature and humidity range. Products shall not be allowed to become damp.
2. Where feasible, remove carpeting from packaging and store in unoccupied, ventilated areas (100% outside air supply, minimum of 1.5 air changes per hour, and no recirculation) for 24-72 hours prior to installation. Carpeting shall not be stored with materials which have high emissions of VOCs or other contaminants. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

1.6 PROJECT CONDITIONS

A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

1.7 WARRANTY

A. Special Warranty for Carpet Tile: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, excess static discharge, and delamination.
3. Warranty Period: Lifetime.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis of Design Products: Subject to compliance with all requirements, provide products indicated or comparable product by one of the following:

1. Mannington Commercial.
2. Tandus.

B. Performance Characteristics:

1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm.
2. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
3. Dimensional Stability: 0.2 percent or less per ISO 2551 (Aachen Test).
4. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.
5. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) per AATCC 16, Option E.
6. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC 174.
7. Electrostatic Propensity: Less than 3.0 kV per AATCC 134.
8. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

C. Carpet Type CPT-001:

1. Manufacturer: Mohawk Group.
2. Style: Taped Off GT197.
3. Color: As indicated on Finish Material List.
4. Pile Characteristic: Textured Patterened Loop.
5. Fiber Type: Duracolor Premium Nylon.
6. Dye Method: solution dyed / yarn dyed.
7. Face Weight: 23 oz/sq. yd.
8. Pile Thickness: 0.103 inches.
9. Stitches: 11.0 per inch.
10. Gage: 1/12 inch.
11. Backing: EcoFlex NXT.
12. Average Density: 8038
13. Size: 24” x 24”
14. Applied Soil-Resistance Treatment: Sentry Soil Protection.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer. Comply with requirements in Division 09 Section “Resilient Tile Flooring” for floor preparation requirements.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.

    a. Perform relative humidity test using in situ probes, in accordance with ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement, or up to the manufacturer's allowed limit for the installed products.
    b. Concrete slab substrates for testing should be at service temperature and relative humidity expected during normal use or at the conditions required for installation of a floor covering material in accordance with manufacturer's written installation instructions for at least 48 hours before making relative humidity measurements.
    c. Perform three tests for the first 1,000 square feet and at least one additional test for each additional 1,000 square feet.

5. Porosity Testing: Perform tests as follows prior to installation of flooring.

    a. Perform water absorption testing in accordance with ASTM F 3191 to determine if the substrate surface is porous or non-porous.
    b. Substrate and ambient temperature: 75 +/- 10 degrees F.
    c. Ambient humidity: 50 +/- 10 percent relative humidity.

6. Moisture testing for new concrete slabs on grade that contain integral waterproofing in accordance with Division 03 Section "Concrete Moisture Vapor Reduction System."

    a. Drilled sample cores of concrete slabs on grade will be tested for permeability and test results provided by the integral waterproofing manufacturer.
    b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

1. Comply with Division 09 Section “Resilient Tile Flooring” for floor underlayment and floor preparation for new and existing slabs.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following substrates:

1. Steel.
2. Hollow metal doors and frames.
3. Interior wood trim.
4. Wood handrail.
5. Gypsum board.
6. Corner guards.
7. Exposed structure.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished components:

a. Architectural casework.
b. Finished mechanical and electrical equipment.
c. Light fixtures and wiring devices.
d. Switchgear.
e. Distribution cabinets in closets or equipment rooms.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Furred areas.
b. Ceiling plenums.
c. Pipe spaces.
d. Duct shafts.

3. Finished metal surfaces include the following:

a. Anodized or coated aluminum.

b. Stainless steel.
c. Chromium plate.
d. Copper and copper alloys.
e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

D. Related Sections include the following:

1. Division 05 Section "Structural Steel" for shop priming structural steel.
2. Division 06 Section “Interior Architectural Woodwork” for items indicated to be field finished by this Section.
3. Division 08 Section "Hollow Metal Doors and Frames" for factory priming steel doors and frames.
4. Division 09 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.
5. Division 10 Section “Wall Protection” for corner guards to be field finished by this Section.
6. Divisions 23 and 26 Sections for painting of mechanical and electrical equipment.

1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
3. Certification by the manufacturer that products supplied comply with State of New York Ozone Transportation Commission (OTC) regulations controlling use of volatile organic compounds (VOCs).

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.

2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.
5. Submit 2 Samples on the following substrates for Architect's review of color and texture only:

    a. Stained Wood: 4-by-8-inch. Samples of natural- or stained-wood finish on representative wood surfaces.

C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For coatings to include in maintenance manuals. Include the following:

1. Area summary with Finish Schedule and area detail designating where each product, color, and finish is used.
2. Product data pages.
3. Material safety data sheets.
4. Care and cleaning instructions.
5. Touch-up procedures.
6. Color samples of each color and finish (gloss level) used.

B. Manual: Provide Sherwin Williams; "Custodian Project Color and Product Information" manual, or equal.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 1 gallon of each material and color applied.

1.7 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Wall Surfaces: Provide samples of at least 100 sq. ft. for each color and accent color.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.9 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co., including affiliate the following affiliate brands:

a. Coronado Paint.
b. Insl-X and Corotech.

2. PPG Architectural Finishes, Inc.; Pittsburgh Paints.
3. Sherwin-Williams Co.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content for Interior Paints and Coatings:

1. All interior paints and coatings shall comply with the VOC content regulations of the Ozone Transportation Commission (OTC) effective in the State of New York**.** For interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

   a. Flat Coatings: 100 g/L.
   b. Nonflat Coatings: 150 g/L.
   c. Nonflat-High Gloss Coatings: 250 g/L.
   d. Primers, sealers and undercoaters: 200 g/L.
   e. Anti-corrosive and Anti-rust Paints Applied to Ferrous Metals: 250 g/L.
   f. Dry-Fog Coatings: 400 g/L.
   g. Clear Wood Finish: Sanding Sealer: 350g/L.
   h. Clear Wood Finish: Varnish: 350 g/L.
   i. Stain: 250 g/L.

C. Colors: As indicated on Finish Schedule.

2.3 INTERIOR PRIMERS

A. General: Provide tinted primers as required for dark colors.

B. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application (**100 g/L)**.

1. Benjamin Moore, Ultra Spec 500 Interior Latex Primer N534: Applied at a dry film thickness of not less than 1.8 mils.
2. Pittsburgh Paints; 6-2 Speedhide Interior Latex Sealer Quick-Drying: Applied at a dry film thickness of not less than 1.0 mil.
3. Sherwin-Williams; ProMar 200 Zero VOC Primer B28W2600: Applied at a dry film thickness of not less than 1.5 mils.

C. Interior Metal Primer: Factory-formulated metal primer (**250 g/L**).

1. Benjamin Moore; Super Spec Acrylic Metal Primer No. P04: Applied at a dry film thickness of not less than 1.7 mils.
2. Pittsburgh Paints; 90-712 Series Pitt-Tech Interior/Exterior Primer/Finish DTM Industrial Enamel: Applied at a dry film thickness of not less than 2.0 mils.
3. Sherwin-Williams; Pro Industrial Pro-Cryl Universal Acrylic Primer B66 Series: Applied at a dry film thickness of not less than 2.0 mils.

2.4 INTERIOR PAINTS

A. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application ceilings and soffits (**50 g/L**).

1. Benjamin Moore, Ultra Spec 500 Interior Flat N536: Applied at a dry film thickness of not less than 1.8 mils.
2. Pittsburgh Paints; 6-70 Series Speedhide Interior Latex Flat: Applied at a dry film thickness of not less than 1.3 mils.
3. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Flat Wall Paint B30-2600 Series: Applied at a dry film thickness of not less than 1.6 mils.

B. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel for walls **(100 g/L).**

1. Benjamin Moore, Ultra Spec 500 Interior Eggshell N538: Applied at a dry film thickness of not less than 1.8 mils.
2. Pittsburgh Paints; 6-411 Series Speedhide Interior Enamel Latex Eggshell: Applied at a dry film thickness of not less than 1.5 mils.
3. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Egg-Shell Enamel B20-2600 Series: Applied at a dry film thickness of not less than 1.6 mils.

C. Interior Semi-Gloss Acrylic Enamel for Metal Surfaces: Factory-formulated semi-gloss acrylic interior enamel (**250 g/L**).

1. Benjamin Moore; Super Spec HP DTM Acrylic Semi-Gloss Enamel P29: Applied at a dry film thickness of not less than 1.5 mils.
2. Pittsburgh Paints; 90-1210 Series Pitt-Tech Plus Interior/Exterior Semi-Gloss DTM Industrial Enamel: Applied at a dry film thickness of not less than 2.0 mils.
3. Sherwin-Williams; Pro Industrial Acrylic B66-650 Series Semi-Gloss: Applied at a dry film thickness of not less than 2.5 mils.

D. Interior Acrylic Enamel (Flat Dryfall): Factory-formulated enamel for overhead interior application ceilings and structural framing (**150 g/L**).

1. Coronado Paint; Super Kote 5000 Latex Flat Dry Fall 110 Line: Applied at a dry film thickness of not less than 1.5 mils.
2. Pittsburgh Paints; SpeedHide Super Tech WB Interior Dry-Fog Flat Latex 6-725XI: Applied at a dry film thickness of not less than 2.2 mils.
3. Sherwin-Williams; Low VOC Waterborne Acrylic Dryfall Flat B42W00081: Applied at a dry film thickness of not less than 1.7 mils.

2.5 INTERIOR WOOD STAINS AND VARNISHES

A. Interior Wood Stain: Factory-formulated water-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer (**250 g/L)**.

1. Lenmar; Waterborne Interior Wood Stain 1WB1300.
2. Pittsburgh Paints; Olympic Premium Interior Oil Based Wood Stain, Tint Base 44500.
3. Sherwin-Williams; Minwax Wood Finish 250 VOC Stains.

B. Clear Sanding Sealer: Factory-formulated fast-drying acrylic polyurethane clear wood sealer applied at spreading rate recommended by manufacturer. **(350 g/L**)

1. Benjamin Moore; Benwood Stays Clear Acrylic Polyurethane Gloss N422.

2. Pittsburgh Paints; Olympic Premium Interior Water Based Sanding Sealer 41061.
3. Sherwin-Williams; Wood Classics Waterborne Polyurethane A68 Series

C. Interior Polyurethane-Based Clear Varnish: Factory- formulated polyurethane-based clear varnish **(350 g/L).**

1. Benjamin Moore; Benwood Stays Clear Acrylic Polyurethane Low Lustre N423.
2. Pittsburgh Paints; Olympic Premium Interior Water Based Polyurethane Clear Satin 42786.
3. Sherwin-Williams; Wood Classics Waterborne Polyurethane A68 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Wood: 15 percent.
2. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Construction Manager about anticipated problems when using the materials specified over substrates primed by others.

E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

F. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

G. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

    a. Switchgear.
    b. Panelboards.
    c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Flat Acrylic Finish (ceilings): Two finish coats over a primer.

    a. Primer: Interior gypsum board primer.
    b. Finish Coats: Interior flat acrylic paint.

2. Low-Luster Acrylic-Enamel Finish (Walls): Two finish coats over a primer.

    a. Primer: Interior gypsum board primer.
    b. Finish Coats: Interior low-luster acrylic enamel.

B. Ferrous and Zinc-Coated Metal: Provide the following finish systems over ferrous metal:

1. Semi-Gloss Acrylic-Enamel Finish: Two finish coats.

    a. Primer: Metal primer, including surfaces with factory prime coat.
    b. Finish Coats: Interior semi-gloss acrylic enamel for metal surfaces.

C. Exposed Structure: Provide the following finish system over exposed metal roof deck, steel structure:

1. Flat Dryfall Acrylic-Enamel Finish: One finish coat.

    a. Finish Coat: Interior acrylic dryfall.

3.6 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

A. Stained Woodwork: Provide the following stained finishes over new interior woodwork:

1. Stain Satin-Varnish Finish: Two finish coats of alkyd-based clear satin varnish over a sealer coat and interior wood stain. Wipe wood filler before applying stain.

a. Stain Coat: Interior wood stain.
b. Sealer Coat: Clear sanding sealer.
c. Finish Coats: Interior polyurethane-based clear satin varnish.

END OF SECTION 099100

SECTION 102600 - WALL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Impact-resistant wall panels.
2. Corner guards.

B. Related Sections:

1. Division 08 Section "Door Hardware" for metal kick, mop, and push plates.
2. Division 09 Section “Painting” for field finishing corner guards.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, impact strength, fire-test-response characteristics, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.

B. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.

C. Samples for Initial Selection: For each type of impact-resistant wall protection unit indicated.

D. Samples for Verification: For each type of exposed finish required.

1. Abuse-Resistant Wall Covering: 6 by 6 inches square.
2. Corner Guards: 12 inches long. Include examples of joinery, corners, top caps, and field splices.

E. Qualification Data: For qualified Installer.

F. Material Certificates: For each impact-resistant plastic material, from manufacturer.

G. Material Test Reports: For each impact-resistant plastic material.

H. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.

1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

I. Warranty: Special warranty included in this Section.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, full length units.

1.5 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Division 01 Section "Quality Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

B. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
2. Keep plastic materials out of direct sunlight.
3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.

a. Store corner-guard covers in a vertical position.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Deterioration of plastic and other materials beyond normal use.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall-protection products of each type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

2.3 MATERIALS

A. Adhesive: As recommended by protection product manufacturer.

B. Plastic Sheet Wallcovering Material: Textured, chemical- and stain-resistant, high-impact, acrylic modified vinyl plastic sheets, thickness as indicated. Comply with specified requirements of ASTM D 256 for impact resistance, ASTM E 84 for flame spread and smoke developed characteristics.

2.4 IMPACT-RESISTANT WALL COVERINGS

A. Impact-Resistant Sheet Wall Panels (**FRP-001**): Fabricated from fiberglass reinforced plastic.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Crane Composites; Glasbord**, or one of the following:

a. Marlite; Standard FRP Panels.
b. Nudo; FiberLite FRP.
c. Panolam; FRP.

2. Size: 48 by 96 inches for sheet.
3. Sheet Thickness: 0.090 inch minimum.
4. Color: As indicated on Finish Material List.
5. Texture: Embossed.
6. Height: As indicated.
7. Trim and Joint Moldings: Extruded rigid plastic that matches sheet wall covering color.
8. Mounting: Adhesive.

2.5 CORNER GUARDS

A. Surface-Mounted, Opaque-Plastic Corner Guards: Fabricated as one piece from paintable textured vinyl; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.

1. Basis-of-Design Product: Subject to compliance with requirements, provide the following, or equal:

a. **Koffler Sales Company; Wallprotex Vinyl Corner Guard**.

2. Wing Size: Nominal 1-1/8 by 1-1/8 inches.
3. Mounting: Self adhered tape.
4. Color: Manufacturer's standard.
5. Provide 48-inch high corner guard at all exposed gypsum board corners.

2.6 FABRICATION

A. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

B. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

1. Install impact-resistant wall protection units in locations and at mounting heights indicated on Drawings.

B. Abuse-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

END OF SECTION 102600

SECTION 104400 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes the following:

1. Fire protection cabinets.
2. Portable fire extinguishers.

B. Related Sections:

1. Division 21 Sections for fire suppression systems.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:

a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets and fire extinguishers.

1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For each type of fire protection cabinet indicated.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Size: 6 by 6 inches square.

E. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire protection cabinets and extinguishers to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cam Lock: Three cam locks per cabinet.

1.8 QUALITY ASSURANCE

A. Source Limitations: Provide fire extinguishers and cabinets from a single source and a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

C. Fire Extinguishers: Listed and labeled for type, rating, and classification.

1. Provide fire extinguishers approved, listed, and labeled by UL.

1.9 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire protection cabinets with wall depths.

1.10 SEQUENCING

A. Apply decals on field-painted, fire protection cabinets after painting is complete.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Basis of Design Product: Subject to compliance with requirements, provide **Larsen's Manufacturing Company; Architectural Series** or comparable product by one of the following:

a. J. L. Industries, Inc., a division of Activar Construction Products Group.
b. Potter Roemer LLC.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Semi-Recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.

1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

E. Cabinet Trim Material: Stainless-steel sheet.

F. Door Material: Stainless-steel sheet.

G. Door Style: Vertical duo panel with frame.

H. Door Glazing: Tempered float glass (clear).

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting lever handle with cam-action latch.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Spring catch.

3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

    a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."

        1) Location: Applied to cabinet door.
        2) Application Process: Die cut lettering.
        3) Lettering Color: Red.
        4) Orientation: Vertical.

K. Materials:

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
2. Stainless-Steel Sheet: ASTM A 666, Type 304.
3. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 6 mm thick, Class 1 (clear).

L. Finishes:

1. Interior: Manufacturer's standard baked-enamel paint.
2. Exterior: Stainless Steel: No. 4.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

1. Valves: Manufacturer's standard.
2. Handles and Levers: Manufacturer's standard.
3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:80-B:C, 10-lb. nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

C. Regular Dry-Chemical Type in Steel Container: UL-rated 40-B:C, 5.5-lb nominal capacity, with sodium bicarbonate-based dry chemical in enameled-steel container.

1. Provide regular dry-chemical type in Mechanical and Electrical Rooms.

D. Wet-Chemical Type: UL-rated 2-A:1-B:C:K, 2.5-gal. nominal capacity, with potassium carbonate-based chemical in stainless-steel container; with pressure-indicating gage.

1. Provide K-type extinguisher in kitchens and similar rooms where cooking media is used.
2. Include a Class K placard at each location in size and wording defined in NFPA 10.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.

3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."

B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

1. Color: selected by Architect from manufacturer's full range.

2.6 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

B. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:

1. Fire Protection Cabinets: 48 inches above finished floor to top of cabinet.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Provide inside latch and lock for break-glass panels.
2. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.

C. Identification: Apply decals at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104400

SECTION 123631 – SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Quartz agglomerate countertops and backsplashes.

B. Related Section:

1. Division 06 Section “Interior Architectural Woodwork.”
2. Division 22 Section for non-integral sinks and plumbing fittings.

1.3 SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples for Verification:

1. Countertop material, 6 inches square.

D. Qualification Data: For Installer and fabricator.

E. Sealant Compatibility Test Report: From sealant manufacturer, complying with requirements in Division 07 Section "Joint Sealants" and indicating that sealants will not stain or damage simulated stone.

F. Maintenance Data: For countertops to include in maintenance manuals. Include Product Data for stone-care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

G. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate simulated stone countertops similar to that indicated for this Project and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of products, or installer approved by fabricator, and a certified participant in AWI’s Quality Certification Program.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Contractor shall register the work of this Section with the AWI Quality Certification Program.
2. Provide AWI Quality Certification labels and certificates indicating that solid surfacing countertops, including installation, comply with requirements of grades specified.
3. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical solid surfacing countertop and backsplash in location as directed by Architect.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of construction to receive countertops by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace solid-surface-material countertops that fail within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Quartz Agglomerate (**QTZ-001, 002**): Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.

1. Basis of Design Product: Subject to compliance with requirements, provide **Caesarstone** or comparable product by one of the following:

a. Cambria.
b. Cosentino USA.
c. E. I. du Pont de Nemours and Company; Zodiaq.

2. Composition: 93% crushed quartz aggregrate combined with resins and pigments, fabricated into slabs using a vacuum vibro-compaction process.

3. Physical properties:

    a. Minimum Compressive Strength (dry) per ASTM C 170: 24,750 psi.
    b. Abrasion Resistance: Minimum value of 139, based on testing according to ASTM C 501.
    c. Fungal and Bacterial Resistance per ASTM G 21 and G 22: No growth.
    d. Surface Burning Characteristics per ASTM E 84: Flame spread of less than 15.
    e. Stain and Acid Resistance per ANSI Z124.6: Not affected.

4. Finish: Polished.
5. Color: As indicated by manufacturer's designations on the Finish Legend.

2.2 QUARTZ AGGLOMERATE COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: As indicated.
2. Backsplash: Straight, slightly eased at corner.
3. Endsplash: Matching backsplash.

B. Countertops: Thickness indicated, quartz agglomerate with front edge built up with same material.

C. Backsplashes: 1/2-inch- thick, quartz agglomerate.

D. Fabrication: Fabricate tops in one piece with shop-applied edges. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

2.3 ADHESIVES, SEALANTS, AND ACCESSORIES

A. General: Use only adhesives formulated for simulated stone and recommended by their manufacturer for the application indicated.

B. Water-Cleanable Epoxy Adhesive: ANSI A118.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Bonsal, W. R. Company.
    b. Laticrete International, Inc.
    c. MAPEI Corp.

C. Joint Sealant: Silicone sealant to comply with Division 07 Section “Joint Sealants.”

D. Cleaner: Cleaner specifically formulated for simulated stone types, finishes, and applications indicated, as recommended by manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates indicated to receive countertops and conditions under which stone countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of countertops.
2. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work acknowledges acceptance of substrates.

3.2 PREPARATION

A. Clean dirty or stained surfaces by removing soil, stains, and foreign materials before setting. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives. Allow stone to dry before installing.

3.3 CONSTRUCTION TOLERANCES

A. Variation from Level: Do not exceed 1/16 inch in 120 inches.

B. Variation in Joint Width: Do not vary joint thickness more than 1/4 of nominal joint width.

C. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch difference between planes of adjacent units.

D. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION OF COUNTERTOPS

A. General: Install countertops by adhering to supports with water-cleanable epoxy adhesive.

B. Set countertops to comply with requirements indicated on Drawings and Shop Drawings. Shim and adjust countertops to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and other attachments indicated or necessary to secure stone countertops in place.

C. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

D. Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive. Leave 1/16-inch gap between countertop and splash for filling with sealant. Use temporary shims to ensure uniform spacing.

1. Apply silicone sealant to gap between wall and backsplash.

E. Apply sealant to joints; comply with Division 07 Section "Joint Sealants." Remove temporary shims before applying sealant.

3.5 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive and sealant smears immediately.

B. Remove and replace simulated stone countertops of the following description:

1. Broken, chipped, stained, or otherwise damaged simulated stone. Simulated stone may be repaired if methods and results are approved by Architect.
2. Defective countertops.
3. Defective joints, including misaligned joints.
4. Interior simulated stone countertops and joints not matching approved Samples and mockups.
5. Interior simulated stone countertops not complying with other requirements indicated.

C. Replace in a manner that results in countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

D. Clean countertops not less than six days after completion of installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage simulated stone.

END OF SECTION 123631

SECTION 210100 - FIRE PROTECTION GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All of the Contract Documents as listed on the Table of Contents and including General and Supplementary Conditions and Division 1 - General Requirements shall be included in and made part of this Section.

1.2 DESCRIPTION OF WORK

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

C. The work under this Contract shall include all labor, materials, tools, equipment, transportation, insurance, temporary protection, supervision and incidental items essential for proper installation and operation, even though not specifically mentioned or indicated on the drawings, but which are usually provided or are essential for proper installation and operation, of all systems as indicated on the drawings and specified herein.

D. The specifications and drawings describe the minimum requirements that must be met by the Fire Protection Subcontractor for the installation of all work as shown on the drawings and as specified herein under.

E. Coordinate work with that of all other Trades affecting or affected by the work of this Section. Cooperate with such Trades to assure the steady progress of all work under the Contract.

1.3 INTENT

A. It is the intent of the Contract Documents to require finished work, tested and ready for operation.

B. It is not intended that Contract Documents show every pipe, fitting and appurtenance; however, such parts as may be necessary to complete the systems in accordance with best trade practice and Code requirements and to Architect’s satisfaction shall be deemed to be included.

C. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. DO NOT SCALE THE DRAWINGS.

1.4 DEFINITIONS

A. Words in the singular shall also mean and include the plural, wherever the context so indicates, and words in the plural shall mean the singular, wherever the context so indicates.

B. “Acceptable”: Acceptable, as determined in the opinion of the Architect.

C. The term “Acceptable equivalent” or “Equal”: Of weight, size, design, capacity and efficiency to meet requirements specified and shown, and of acceptable manufacturer, as determined in the opinion of the Architect.

D. "Accessible": Indicates ease of access with or without the use of ladders and without requiring extensive removal of other equipment, such as ductwork, piping, etc. to gain access. "Accessible ceiling" indicates acoustic tile type hung ceilings. Concealed spline or sheetrock ceilings with access panels shall not be considered accessible ceilings.

E. "Approved", or "Approval": Shall mean the written approval of the Architect.

F. "Architect": Shall refer to the Architect: “Phase Zero Design” and/or the Engineer "Innovative Engineering Services, LLC.”

G. “Concealed”: Hidden from site, embedded in masonry or other construction; or installed in furred spaces, trenches or crawl spaces; or installed within double partitions or hung ceilings; or in enclosures.

H. The term "Contract Documents": Shall mean the entire set of Drawings and Specifications as listed in the Table of Contents of the General Conditions including all bound and unbound material and all items officially issued to date such as addenda, bulletins, job modifications, etc.

I. “Contractor”: General Contractor.

J. The term "Directed", "Required", "Permitted", "Ordered", "Designated", "Prescribed", and similar words: Shall mean the direction, requirement, permission, order, designation or prescription of the Architect; the terms "Approved", "Acceptable", "Satisfactory", and similar words shall mean approved by, acceptable or satisfactory to the Architect; and, the terms "Necessary", "Reasonable", "Proper", "Correct", and similar words shall mean necessary, reasonable, proper or correct in the judgment of the Architect.

K. “Exposed”: Visible to building occupants, excluding mechanical room and utility tunnel locations.

L. The term “Furnish” or “Supply”: Shall mean purchase, deliver to, and off-load at the job site, ready to be installed including where appropriate all necessary interim storage and protection.

M. The term “Finished”: Refers to all rooms and areas to be specified to receive architectural treatment as indicated on the drawings. All rooms and areas not covered, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

N. The term “Indicated”: Refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

O. “Installed”: Shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

P. "Material": Is used in the specifications it will mean any "Product", "Equipment", "Device", "Assembly", or "Item" required under the Contract, as indicated by trade or brand name, manufacturer's name, standard specification reference or other description.

Q. “Named” Product: Manufacturer’s name for product, as recorded in published documents of latest issue as of date of Contract Documents. Obtain Architect’s permission before using products of later or earlier model.

R. "Owner": Shall refer to the Owner: [“Purchase College State University of New York”] or designated representative.

S. "Other Work Contractor" (O.W.C.): Refers to the Contractor(s), or Subcontractor(s) performing work under other Sections of the Contract Documents.

T. "Fire Protection Subcontractor": Refers to the Subcontractor responsible for furnishing and installation of all work indicated on the Fire Protection drawings and in the Fire Protection specifications.

U. “Product”: Shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

V. "Provide": Is used in the specifications it will mean "Furnish" and "Install", "Connect", "Apply", Erect", "Construct", or similar terms, unless otherwise indicated in the specifications.

W. The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work

X. The term “Remove” means to disconnect from its present position, remove from the premises and to dispose of in a legal manner.

Y. The term "Shown on Drawings": Is used in the specifications, they shall mean "Noted", "Indicated", "Scheduled", "Detailed", or any other diagrammatic or written reference made on the drawings

Z. The term “Special Warranties” Are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

AA. "Specification": Shall mean all information contained in the bound or unbound volume, including all "Contract Documents" defined therein, except for the drawings.

BB. The term “Standard Product Warranties” Are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

CC. “Substitution”: Requests for changes in products, materials, equipment, and methods of construction proposed by the Contractor are considered requests for "Substitutions”.

DD. “Wiring”: Shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

EE. “Work”: Labor, materials, equipment, apparatus, controls and accessories required for proper and complete installation.

1.5 RELATED WORK

A. For work to be included as part of this Section, to be furnished and installed by the Fire Protection Subcontractor, refer to the following Sections:

1. Section 210513 Common Motor Requirements for Fire Suppression Equipment.
2. Section 210517 Sleeves and Sleeve Seals for Fire Suppression Piping.
3. Section 210518 Escutcheons for Fire-Suppression Piping.
4. Section 210523 General Duty Valves, Pipe, Fittings and Hangers for Fire Suppression Systems.
5. Section 210548 Vibration and Seismic Controls for Fire Suppression Piping and Equipment.

6. Section 211100 Facility Fire Suppression Water-Service Piping
7. Section 210553 Identification for Fire Suppression Piping and Equipment.
8. Section 210700 Fire Suppression System Insulation.
9. Section 211313 Wet Pipe Sprinkler Systems.
10. Section 211316 Dry Pipe Sprinkler Systems.

B. For work related to, and to be coordinated with the Fire Protection work, but not included in this Section and required to be performed under other designated Sections, see the following:
1. Division 1 Section “General Commissioning Requirements” for Fire Protection construction.
2. Division 4 Section “Masonry Work” for Fire Protection construction.
3. Division 7 Section “Firestopping”.
4. Division 7 Section “Caulking, Flashing, Waterproofing, Roofing and setting of Roof Drains”.
5. Division 8 Section “Access Panels”.
6. Division 9 Section “Painting”.

1.6 DRAWINGS

A. The Contract Drawings are diagrammatic only intending to show general runs and locations of the piping, equipment, systems equipment, etc. and not necessarily showing all required offsets, details and accessories and equipment to be connected. All work shall be accurately laid out with other Trades to avoid conflicts and to obtain a neat and workman like installation which will afford maximum accessibility for operation, maintenance and headroom.

B. Where discrepancies in scope of work as to what Trade provides items, such conflicts shall be reported to the Architect during bidding and prior to signing of the Contract. If such action is not taken, the Fire Protection Subcontractor shall furnish such items as part of his work as necessary, for complete and operable systems and equipment, as determined by the Architect.

C. The Fire Protection Subcontractor shall coordinate the installation of all equipment.

D. Where drawing details, plans, specification requirements and/or scheduled equipment capacities are in conflict or equipment are shown to be different between plans and/or between plans and riser diagrams, details or specifications, the most stringent requirement will be included in the Contract. Fire Protection systems and equipment called for in the specification and/or shown on the drawings shall be provided under this Contract as if it were required by both the drawings and specifications. However, prior to ordering or installation of any portion of work which appears to be in conflict, such work shall be brought to Architect's attention for direction as to what is to be provided.

1.7 CODES AND STANDARDS

A. All materials and workmanship shall comply with all applicable Codes, Specifications, Local and State Ordinances, Industry Standards and Utility Company Regulations, latest editions.

B. In case of difference between Building Codes, State Laws, Local Ordinances, Industry Standards and Utility Company Regulations and the Contract Documents, the Fire Protection Subcontractor shall promptly notify the Architect in writing of any such difference.

C. In case of conflict between the Contract Documents and the requirements of any Code or Authorities having jurisdiction, the most stringent requirements of the aforementioned shall govern.

D. Should the Fire Protection Subcontractor perform any work that does not comply with the requirements of the applicable Building Codes, State Laws, Local Ordinances, Industry Standards and Utility Company

Regulations, he shall bear all costs arising in correcting the deficiencies, as approved by the Architect/Owner.

E. Applicable Codes and Standards shall include all State Laws, Local Ordinances, Utility Company Regulations, and the applicable requirements of the latest adopted edition of the following Codes and Standards, without limiting the number, as follows:

1. International Building Code Latest Adopted Edition and Amendments of The State of New York.
2. International Existing Building Code Latest Adopted Edition and Amendments of The State of New York.
3. International fire Code Latest Adopted Edition and Amendments of The State of New York.
4. The State of New York 2017 Uniform Code Supplement.
5. NFPA 13: Standards for the Installation of Sprinkler Latest Adopted Edition and Amendments of The State of New York.
6. NFPA 70: National Electrical Code Latest Adopted Edition and Amendments of The State of New York.
7. NFPA 72: National Fire Alarm Code Latest Adopted Edition and Amendments of The State of New York.
8. NFPA 101: Life Safety Code Latest Adopted Edition and Amendments of The State of New York.
9. Occupational Safety and Health Administration, (OSHA)
10. Department of Environmental Protection, (DEP)
11. Local Building Code.

F. In these specifications, references made to the following Industry Standards and Code Bodies are intended to indicate the latest volume or publication of the Standard. All equipment, materials and details of installation shall comply with the requirements and latest revisions of the following Bodies, as applicable:

ANSI:	American National Standards Institute
ASTM:	American Society of Testing Materials
FM:	Factory Mutual
NEMA:	National Electrical Manufacturers Association
UL:	Underwriters' Laboratories
IRI:	Industrial Risk Insurers
ISO:	Insurance Services Office
NBS:	National Bureau of Standards
NSC:	National Safety Council

1.8 PERMITS AND FEES

A. Fire Protection Subcontractor for the work in his scope of work shall give all necessary notices, obtain all permits, pay all governmental taxes, fees and other costs in connection with his work; file for necessary approvals with the jurisdiction under which the work is to be performed. Fire Protection Subcontractor shall obtain all required Certificates of Inspection for his respective work and deliver same to the Architect before request for acceptance of his portion of work is made and before final payment.

1.9 QUALITY ASSURANCE

A. The manufacturers listed within these specifications have been preselected for use on this project. No submittal will be accepted from a manufacturer other than specified.

B. Fire Protection Subcontractor shall furnish and install all equipment, accessories, connections and incidental items necessary to fully complete the work under his Contract for use, occupancy and operation by the Owner.

C. Where equipment of a substitute manufacturer differs from that specified and require different arrangement or connections from those shown, it shall be the responsibility of the Subcontractor responsible for the substitution to modify the installation of the equipment/system to operate properly and in harmony with the original intent of the drawings and specifications. When directed by the Architect, the Fire Protection Subcontractor shall submit drawings showing the proposed, substitute installation. If the proposed installation is accepted, the Fire Protection Subcontractor shall make all necessary changes in all affected related work provided under his and other Sections including location of roughing-in connections by other Trades, supports, etc. All changes shall be made at no increase in the Contract amount or additional cost to the Owner. The General Contractor shall be responsible to assure that the Subcontractor responsible for the substitution bears the cost arising to all other Trades as a result of the substitution.

D. Unless specifically indicated otherwise, all equipment and materials required for installation under these specifications shall be new, unused and without blemish or defect. Equipment and materials shall be products which will meet with the acceptance of the Authorities having jurisdiction over the work and as specified hereinbefore. Where such acceptance is contingent upon having the products listed and/or labeled by FM or UL or another testing laboratory, the products shall be so listed and/or labeled. Where no specific indication as to the type or quality of material or equipment is indicated, a first class standard article shall be provided.

1.10 SUBSTITUTIONS

A. Contractor shall pay Architect/Engineer for time spent reviewing substitution requests. Charges shall be $150/hour. Submittal of substitution request will be construed as evidence of Contractor’s agreement to pay such charges, with no added cost to Owner.

B. Contractor's request for substitution may be submitted only after award of Contract. Requests shall be in writing on Contractor's letterhead and shall include:
   1. Contractor's detailed comparison of significant qualities between specified item and proposed substitution.
   2. Statement of effect on construction time, coordination with other affected work, and cost information or proposal.
   3. Contractor's statement to the effect that proposed substitution will result in overall work equal to, or better than, work originally intended.

C. Substitution requests will be considered: If extensive revisions to Contract Documents are not required; if changes are in keeping with general intent of Contract Documents; if submitted in timely and proper manner, fully documented; and if one or more of following conditions is satisfied; all as judged by Architect:
   1. Where request is directly related to "acceptable equivalent" clause, "or equal" clause or words of similar effect in Contract Documents.
   2. Where specified product, material or method cannot be provided within Contract Time; but not as a result of Contractor's failure to pursue the work promptly or to coordinate various activities properly.
   3. Where specified product, material or method cannot be provided in manner which is compatible with other materials of the work and where Contractor certifies that proposed substitution is compatible.
   4. Where specified product, material or method cannot be properly coordinated with other materials of the work and where Contractor certifies that proposed substitution can be properly coordinated.
   5. Where specified product, material or method cannot be warranted as required and where Contractor certifies that proposed substitution can be so warranted.
   6. Where specified product, material or method cannot be used without adversely affecting Owner's insurance coverage on completed work and where Contractor certifies that proposed substitution can be so used.
   7. Where specified product, material or method will encounter other substantial non-compliance, which are not possible to otherwise overcome except by using proposed substitution.
   8. Where specified product, material or method cannot receive required approval by governing authority and proposed substitution can be so approved.
   9. Where substantial advantage is offered to the Owner; in terms of cost, time, energy conservation or other valuable considerations; after deducting offsetting responsibilities that Owner may be required to bear, including additional compensation to Architect for redesign and evaluation services, increased cost of other work by Owner or separate contractors, and similar considerations.

D. The burden is upon the Contractor, supplier and manufacturer to satisfy Architect that:
   1. Proposed substitute is equal to, or superior to, the item specified.
   2. Intent of the Contract Documents, including required performance, capacity, efficiency, quality, durability, safety, function, appearance, space clearances and delivery date, will be equaled or bettered.

E. Submission of shop drawings of unspecified manufacturer or shop drawings at variance with the Contract Documents is not a proper request for substitution.

F. Changes in work of other trades, such as structural supports, which are required as a result of substitution and the associated costs for such changes, shall be the complete responsibility of Contractor proposing substitution. Except as noted in subparagraph 1.11.C.9 above, there shall be no additional expense to the Owner.

1.11 SUBMITTALS

A. Prepare and submit shop drawings in accordance with the requirements hereinbefore specified, and with Division 1 Section "Submittal Procedures" in the manner described therein, modified as noted hereinafter.

B. The selection and intention to use a product specified by name shall not excuse the need for timely submission of shop drawings for that product.

C. Prior to submitting shop drawings, submit for review preliminary list of intended or proposed manufacturers for all items for which shop drawings are required.

D. Submission of shop drawings of an unnamed manufacture or shop drawings at variance with the Contract Documents is not a proper request for substitution.

E. Samples that are submitted in lieu of shop drawings shall be clearly identified and shall be submitted in duplicate. Only one sample will be returned and that accepted sample shall be kept available at appropriate job site office. Accepted sample retained by Architect will be kept available at Architect's home office.

F. Upon completion of shop drawing review, shop drawings will be returned, marked with one of following notations: No Exception Taken, Revise as Noted, Revise and Resubmit, or Rejected. Only products whose shop drawings are marked "No Exception Taken" or "Revise as Noted" shall be used on the project.

G. Submittals shall include the following information:
   1. Descriptive and product data necessary to verify compliance with Contract Documents.
   2. Manufacturer's specifications including materials of construction, metal gauge, thickness and finish.
   3. Certified dimensional drawings including clearances required for maintenance or access.
   4. Performance data, ratings, operating characteristics, and operating limits.
   5. Electrical ratings and characteristics.
   6. Wiring and control diagrams, where applicable.
   7. Certifications requested, including UL label or listing.
   8. List of accessories, which are required but are not being provided by the product manufacturer or are not being furnished under this Section. Identify the Section(s) under which the accessories are being furnished.

H. In addition, submittals shall be clearly marked for the following:
   1. Specification Section and Paragraph, or Drawing Schedule/Note/Detail/etc., where equipment is specified.
   2. Equipment or fixture identification corresponding to that used in Contract Documents.
   3. Accessories and special or non-standard features and materials which are being furnished.

1.12 PRODUCT SELECTION

A. Contractor's options for selecting products are limited by Contract Document requirements and governing regulations and are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are not necessarily limited to, following various methods of specifying:
   1. Single Product Manufacturer Named: Provide product indicated. Advise Architect, and obtain instructions before proceeding, when named product is known to be unacceptable or not feasible.
   2. Two or More Manufacturers' Products Named: Provide one of the named products, at Contractor's option, but excluding products which do not comply with requirements. Do not provide, nor offer to provide, an unnamed product unless named products do not comply with requirements or are not feasible.

3. "Acceptable Equivalent" or "Or Equal": Where named products are accompanied by this term or words of similar effect, provide named products or propose substitute product according to paragraph 1.10, SUBSTITUTIONS.
4. Standards, Codes and Regulations: Where specification requires only compliance with a standard, code or regulation, Contractor may select any product which complies with requirements of that standard, code or regulation.
5. Performance Requirements: Provide products which comply with specific performances indicated and which are recommended by manufacturer (in published product literature or by individual certification) for application intended. Overall performance of product is implied where product is specified with only certain specific performance requirements.
6. Prescriptive Requirements: Provide products which have been produced in accordance with prescriptive requirements using specified materials and components, and complying with specified requirements for fabricating, finishing, testing and other manufacturing processes.
7. Visual Matching: Where matching with an established material is required, Architect's judgment of whether proposed product matches established material shall be final. Where product specified does NOT match established material, propose substitute product according to paragraph 1.10, SUBSTITUTIONS. Follow requirements for CHANGE ORDERS, also, if matching product within cost category of specified product is not available.
8. "Color as Selected by Architect": Unless otherwise noted, where specified product requirements include "Color as Selected by Architect" or words of similar effect, the selection of manufacturer and basic product complying with Contract Documents is Contractor's option and subsequent selection of color is Architect's option.

B. Inclusion by name, of more than one manufacturer or fabricator, does not necessarily imply acceptability of standard products of those named. All manufacturers, named or proposed, shall conform, with modification as necessary, to criteria established by contract documents for performance, efficiency, materials and special accessories.

1.13 COORDINATION DRAWINGS

A. Before materials are purchased, fabricated or work is begun, each Subcontractor shall prepare and obtain approval of coordination drawings, and sections for all floors/areas, including buried system/services, resulting in one (1) set of all-Trade-composite at 3/8" scale drawings, showing the size and location of all equipment, in the manner described herein under General Requirements. Architects review and approval of coordination drawings must be obtained prior to any fabrication or installation of any equipment or systems.

B. The coordination drawings shall be generated from a computer CAD program compatible with AutoCAD Release 2013, in DWG or DXF format. The Fire Protection Subcontractor shall take the lead, supervise, and coordinate production of coordinated layout drawings, to show and coordinate all equipment. These drawings shall then be circulated to the Plumbing and HVAC Subcontractor so that he can indicate all his work as directed by the General Contractor and Architect and as required, to result in a fully coordinated installation.

C. All costs associated with all aspects of coordination drawings, regardless as to how long they take to produce and how many times they have to be redrawn, shall be borne by the Fire Protection Subcontractor.

D. The Fire Protection Subcontractor may purchase the Fire Protection AutoCAD computer drawing files from the Fire Protection Contract set on disk or via modem from the Engineer at the nominal cost of $500.00, if he so chooses.

1.14 COORDINATION OF WORK WITH OTHER TRADES

A. The Fire Protection Subcontractor shall compare his drawings and specifications with those of other Trades as well as the Architectural drawings and specifications, and report any discrepancies between them to the Architect and obtain from the Architect written instructions for changes necessary in the Fire Protection work.

B. Coordinate work with that of all other Trades affecting or affected by the work of this Section. Cooperate with such Trades to assure the steady progress of all work under the Contract.

C. All work shall be installed in cooperation with other Trades installing interrelated work. Before installation, Fire Protection Subcontractor shall make proper provisions to avoid interferences in a manner approved by the Architect. All changes required in the work of the Fire Protection Subcontractor or that of any other trade caused by the Fire Protection Subcontractor's neglect, shall be made by him at his own expense, to the Architect's satisfaction.

D. The Fire Protection Subcontractor must include in his bid sufficient dollar amounts to coordinate the work of this Contract. This project is complex and will require additional time to coordinate all Trades and allow implementation of the Owners Standards and maintenance serviceability requirements. This requirement shall include, but not be limited to, producing the coordination drawings, as many times and as many drawings as required, to ensure serviceability of equipment, as approved by the Architect.

E. Locations of ductwork and piping distribution, equipment, systems, etc. shall be adjusted to accommodate the work with interferences anticipated and encountered. The Fire Protection Subcontractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination drawings shall be completed to verify dimensions and characteristics of the various systems installations.

F. Lines which pitch shall have the right-of-way over those which do not pitch. For example, steam piping shall normally have the right-of-way. Lines whose elevations cannot be changed shall have the right-of-way over lines whose elevations can be changed.

G. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Fire Protection Subcontractor shall provide elbows, fittings, offsets in piping, etc. as required for his work to affect these offsets, transitions and changes in direction.

H. All work shall be installed in a way to permit removal (without damage to other parts) all other system components provided under this Contract requiring periodic replacement or maintenance. All work shall be done to allow easy access for maintaining equipment. The Owner and Engineer will require proof via the preparation of large scale sections and part plans that pull and junction boxes, etc. are accessible after the work is completed. Any items in the field discovered to be in non-compliance shall be removed and relocated, as required, and as directed by the Architect.

I. Any equipment shown on the Fire Protection and/or Architectural drawings to be provided with services shall be included under this Contract as applicable to make equipment complete and operable. Additional equipment, etc., shall be provided to accomplish the above requirement, as required, all as part of this Contract, at no extra cost to the Owner. This requirement necessitates that the Fire Protection Subcontractor review the Architectural drawings and the drawings of other Trades during bidding to ascertain the extent of all requirements, and interface between the Trades and scope of work.

J. The Fire Protection Subcontractor shall coordinate his work with other Trades' work so that all equipment and systems can be easily, safety and properly serviced and maintained. It is imperative that service personnel can safely access all equipment. Provide safety rails, steps, ladders, valve chains, handle extensions, etc. as required, in addition to the ones shown on the drawings, to ensure safe and easy access to all equipment is provided in a manner approved by the Architect.

1.15 WARRANTY

A. Attention is directed to provisions of the General Requirements and Supplementary General Requirements regarding and warranties for work under this Contract.

B. All warranties shall begin on the Date of Substantial Completion of the entire project or the Owner's acceptance of the workmanship and/or material covered by the warranty, whichever is later. The warranty coverage shall continue for the specified period. Refer to individual specification sections for warranty period. If no specific warranty period is specified, the warranty shall extend for a minimum of 365 days.

C. Manufacturers shall provide their standard warranties for work under the Fire Protection Trades. However, such warranties shall be in addition to, and not in lieu of, all other liabilities which the manufacturer and Fire Protection Subcontractor may have by law or by other provisions of the Contract Documents.

D. All materials, items of equipment and workmanship furnished under the Fire Protection Section shall carry the standard warranty against all defects in material and workmanship. Any fault due to defective or improper material, equipment, workmanship or design which may develop shall be made good, forthwith, by and at the expense of the Fire Protection Subcontractor for the work under his Contract, including all other damage done to areas, materials and other systems resulting from this failure.

E. The Fire Protection Subcontractor shall warranty that all elements of the systems which are to be provided under his Contract, are of sufficient capacity to meet the specified performance requirements as set forth herein or as indicated.

F. Upon receipt of notice from the Owner or Architect of failure of any part of the systems or equipment during the warranty period, the affected part or parts shall be replaced by the Fire Protection Subcontractor for his work or any other work affected by the failure(s).

G. Fire Protection Subcontractor shall furnish, before the final payment is made, a written warranty covering the above requirements in accordance with the General Requirements.

1.16 THE SUBCONTRACTOR

A. The Fire Protection Subcontractor shall visit the site of the proposed new facility and base his bids from his own site examinations and estimates. The Fire Protection Subcontractor shall not hold the Architect, Engineer, Owner or their agents or employees responsible for, or bound by, any schedule, estimate or of any plan thereof. The Fire Protection Subcontractor shall study the Contract Documents included under this Contract to determine exactly the extent of work provided under this Contract, as well as to ascertain the difficulty to be encountered in performing the work, in installing new equipment and systems and coordinating the work with the other Trades and existing building conditions.

B. The Fire Protection Subcontractor shall faithfully execute his work according to the terms and conditions of the Contract and specifications, and shall take all responsibility for and bear all losses resulting to him in the execution of his work.

C. The Fire Protection Subcontractor shall be responsible for the location and performance of work provided under his Contract as indicated on the Contract Documents. All parties employed directly or indirectly by the Fire Protection Subcontractor shall perform their work according to all the conditions as set forth in these specifications.

D. The Fire Protection Subcontractor shall furnish all materials and do all work in accordance with these specifications, and any supplementary documents provided by the Architect. The work shall include everything shown on the drawings and/or required by the specifications as interpreted by the Architect, regardless of where such information is indicated in the Contract Documents (Architectural, Electrical,

Plumbing, HVAC, etc.). Unless specifically indicated otherwise, all work and materials furnished and installed shall be new, unused and of the best quality and workmanship. The Fire Protection Subcontractor shall cooperate with the Architect so that no error or discrepancy in the Contract Documents shall cause defective materials to be used or poor workmanship to be performed.

1.17 COORDINATION OF WORK

A. The Fire Protection Subcontractor shall compare his drawings and specifications with those of other Trades as well as the Architectural drawings and specifications, and report any discrepancies between them to the Architect and obtain from the Architect written instructions for changes necessary in the Fire Protection work.

B. Coordinate work with that of all other Trades affecting or affected by the work of this Section. Cooperate with such Trades to assure the steady progress of all work under the Contract.

C. All work shall be installed in cooperation with other Trades installing interrelated work. Before installation, Fire Protection Subcontractor shall make proper provisions to avoid interferences in a manner approved by the Architect. All changes required in the work of the Fire Protection Subcontractor or that of any other trade caused by the Fire Protection Subcontractor's neglect, shall be made by him at his own expense, to the Architect's satisfaction.

D. The Fire Protection Subcontractor must include in his bid sufficient dollar amounts to coordinate the work of this Contract. This project is complex and will require additional time to coordinate all Trades and allow implementation of the Owners Standards and maintenance serviceability requirements. This requirement shall include, but not be limited to, producing the coordination drawings, as many times and as many drawings as required, to ensure serviceability of equipment, as approved by the Architect.

E. Locations of ductwork and piping distribution, equipment, systems, etc. shall be adjusted to accommodate the work with interferences anticipated and encountered. The Fire Protection Subcontractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination drawings shall be completed to verify dimensions and characteristics of the various systems installations.

F. Lines which pitch shall have the right-of-way over those which do not pitch. For example, steam piping shall normally have the right-of-way. Lines whose elevations cannot be changed shall have the right-of-way over lines whose elevations can be changed.

G. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Fire Protection Subcontractor shall provide elbows, fittings, offsets in piping, etc. as required for his work to affect these offsets, transitions and changes in direction.

H. All work shall be installed in a way to permit removal (without damage to other parts) all other system components provided under this Contract requiring periodic replacement or maintenance. All work shall be done to allow easy access for maintaining equipment. The Owner and Engineer will require proof via the preparation of large scale sections and part plans that pull and junction boxes, etc. are accessible after the work is completed. Any items in the field discovered to be in non-compliance shall be removed and relocated, as required, and as directed by the Architect.

I. The Contract Drawings are diagrammatic only intending to show general runs and locations of the ductwork, piping, equipment, systems equipment, etc. and not necessarily showing all required offsets, details and accessories and equipment to be connected. All work shall be accurately laid out with other Trades to avoid conflicts and to obtain a neat and work-man-like installation which will afford maximum accessibility for operation, maintenance and headroom.

J. Where discrepancies in scope of work as to what Trade provides items, such conflicts shall be reported to the Architect during bidding and prior to signing of the Contract. If such action is not taken, the Fire Protection Subcontractor shall furnish such items as part of his work as necessary, for complete and operable systems and equipment, as determined by the Architect.

K. The Fire Protection Subcontractor shall coordinate the installation of all equipment.

L. Where drawing details, plans, specification requirements and/or scheduled equipment capacities are in conflict or equipment are shown to be different between plans and/or between plans and riser diagrams, details or specifications, the most stringent requirement will be included in the Contract. Fire Protection systems and equipment called for in the specification and/or shown on the drawings shall be provided under this Contract as if it were required by both the drawings and specifications. However, prior to ordering or installation of any portion of work which appears to be in conflict, such work shall be brought to Architect's attention for direction as to what is to be provided.

M. Any equipment shown on the Fire Protection and/or Architectural drawings to be provided with services shall be included under this Contract as applicable to make equipment complete and operable. Additional equipment, etc., shall be provided to accomplish the above requirement, as required, all as part of this Contract, at no extra cost to the Owner. This requirement necessitates that the Fire Protection Subcontractor review the Architectural drawings and the drawings of other Trades during bidding to ascertain the extent of all requirements, and interface between the Trades and scope of work.

N. The Fire Protection Subcontractor shall coordinate his work with other Trades' work so that all equipment and systems can be easily, safety and properly serviced and maintained. It is imperative that service personnel can safely access all equipment. Provide safety rails, steps, ladders, valve chains, handle extensions, etc. as required, in addition to the ones shown on the drawings, to ensure safe and easy access to all equipment is provided in a manner approved by the Architect.

1.18 GIVING INFORMATION

A. Fire Protection Subcontractor shall keep himself fully informed as to the shape, size and position of all openings required for his apparatus and shall give information to the General Contractor and other Subcontractors sufficiently in advance of the work so that all openings may be built in advance.

1.19 EQUIPMENT AND MATERIALS

A. Equipment and materials shall be delivered to the site and stored in original sealed containers, suitably sheltered from the elements, but readily accessible for inspection by the Architect until installed. All items subject to moisture damage such as controls shall be stored in dry, heated spaces.

B. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical injury and theft. At the completion of the work, equipment and materials shall be cleaned and polished thoroughly and turned over to the Owner in a condition satisfactory to the Architect. Damage or defects that develop before acceptance of the work shall be made good at the Fire Protection Subcontractor's expense.

C. The Fire Protection Subcontractor shall make necessary field measurements to ascertain space requirements, for equipment and connections to be provided under his respective trade and shall furnish and install such sizes and shapes of equipment to allow for the final installation to conform to the drawings and specifications.

D. Manufacturer's directions shall be followed completely in the delivery, storage, protection and installation. Promptly notify the Architect in writing of any conflict between any requirements of the Contract Documents and the manufacturer's directions. Obtain the Architect's written instructions before proceeding with the work. Should Fire Protection Subcontractor perform any work that does not comply

with the manufacturer's directions or written instructions from the Architect, he shall bear all costs arising in correcting any deficiencies that should arise.

E. All equipment of one type shall be the products of one manufacturer.

F. Equipment pre-purchased by the General Contractor on behalf of the Owner or by the Owner himself, if assigned to the Fire Protection Subcontractor, shall be received, installed, tested, etc., as if the equipment was purchased by the Fire Protection Subcontractor. All guarantees, service contracts, etc., shall be the same as for all other equipment provided under this Contract.

1.20 USE OF PREMISES

A. The Fire Protection Subcontractor shall confine all apparatus, storage of materials and construction to the limits as directed by the Architect and he shall not encumber the premises with his materials. The Fire Protection Subcontractor shall be held responsible for repairs, patching, or cleaning arising from any unauthorized use of premises.

B. Notwithstanding any approvals or instructions which must be obtained by the Fire Protection Subcontractor from the Architect in connection with the use of the premises, the responsibility for the safe working conditions at the site shall remain that of the Fire Protection Subcontractor. The Architect, Engineer or Owner shall not be deemed to have any responsibility or liability in connection with safe working conditions at the site.

1.21 PROTECTION

A. Materials, equipment, etc., shall be properly protected during construction and all conduit openings shall be temporarily closed so as to prevent obstruction and damage. Post notice prohibiting the use of all systems provided under the Fire Protection Contract, prior to completion of work and acceptance of all systems by the Owner except as otherwise, instructed by Architect. Take precautions to protect all materials furnished from damage and theft.

B. The Fire Protection Subcontractor shall furnish, place and maintain proper safety guards for the prevention of accidents that might be caused by the workmanship, materials, equipment or Fire Protection systems provided under his Contract.

1.22 DAMAGE TO OTHER WORK

A. The Fire Protection Subcontractor shall be held responsible and shall pay for all damages caused by his work to the building structures, equipment, systems, etc., and all work and finishes installed under this Contract. Repair of such damage shall be done by the General Contractor at the expense of the Fire Protection Subcontractor, to the Architect's satisfaction.

1.23 CORRECTION OF WORK

A. The Fire Protection Subcontractor shall promptly correct all work provided under his Contract and rejected by the Architect as defective or as failing to conform to the Contract Documents, whether observed before or after completion of work, and whether or not fabricated, installed or completed.

1.24 EXTRA WORK

A. No claim for extra work will be allowed unless it is authorized by the Architect before commencement of the extra said work.

1.25 TOUCH-UP PAINTING

A. All equipment and systems shall be thoroughly cleaned of rust, splatters and other foreign matter of discoloration leaving every part of all systems in an acceptable prime condition. The Fire Protection Subcontractor for the work under his Contract shall refinish and restore to the original condition all equipment which has sustained damage to the manufacturer's prime and finish coats of paint and/or enamel during the course of construction, regardless of the source of damage.

1.26 PARTS LIST AND INSTRUCTIONS FOR OPERATION AND MAINTENANCE

A. The Fire Protection Subcontractor shall thoroughly instruct the Owner, to the complete satisfaction of the Architect, in the proper operation of all systems and equipment provided by him. The Fire Protection Subcontractor shall make arrangements, via the Architect, as to whom the instructions are to be given in the operation of the basic and auxiliary systems and the period of time in which they are to be given. The Architect shall be completely satisfied that the Owner has been thoroughly and completely instructed in the proper operation of all systems and equipment before final payment is made. If the Architect determines that complete and thorough instructions have not been given by the Fire Protection Subcontractor to the Owner's representative, then the Fire Protection Subcontractor shall be directed by the Architect to provide whatever instructions are necessary until the intent of this specification has been complied with.

B. Fire Protection Subcontractor shall submit to the Architect for approval, the required typed sets (see General Conditions and Division 1) bound neatly in loose-leaf binders, of all instructions for the installation, operation, emergency operation, start-up, care and maintenance of all equipment and systems (including instructions for the ordering and stocking of spare parts for all equipment installed under this Contract). The lists shall include part numbers and suggested supplier. Each set shall also include an itemized list of component parts that should be kept on hand and where such parts can be purchased.

C. Information shall indicate possible problems with equipment and suggested corrective action. The manuals shall be indexed for each type of equipment. Each section shall be clearly divided from the other sections. A sub-index for each section shall also be provided. The methodology of setting-up the manuals shall be submitted to the Architect and Owner for review prior to final submission of manuals.

1.27 MANUFACTURER'S REPRESENTATIVE

A. The Fire Protection Subcontractor shall provide, at the appropriate time or as directed by Architect, the on-site services of a competent factory trained Engineer of the manufacturer of specific equipment, to inspect, test, adjust and place in proper operating condition any and all items of the same manufacturer. No additional compensation will be allowed for such services. A written report shall be issued by the particular manufacturer with his findings for the Architect's record.

1.28 RECORD DRAWINGS/AS-BUILT DRAWINGS

A. The Fire Protection Subcontractor shall maintain current at the site a set of his drawings on which he shall accurately show the actual installation of all work provided under his Contract indicating hereon any variation from the Contract Drawings, in accordance with the General Conditions and Division 1. Changes, whether resulting from formal change orders or other instructions issued by the Architect, shall be recorded. Include changes in sizes, location, and dimensions of equipment, etc.

B. The Fire Protection Subcontractor shall indicate progress by coloring-in equipment and associated appurtenances exactly as they are erected. This process shall incorporate both the changes noted above and all other deviations from the original drawings whether resulting from job conditions encountered or from any other causes.

C. The marked-up and colored-up prints will be used as a guide for determining the progress of the work installed. They shall be inspected periodically by the Architect and Owner and they shall be corrected immediately if found either inaccurate or incomplete. This procedure is mandatory.

D. At the completion of the job, these prints shall be submitted to the General Contractor and then to the Architect for final review and comment. The prints will be returned with appropriate comments and recommendations. These corrected prints, together with corrected prints indicating all the revisions, additions and deletions of work, shall form the basis for preparing a set of As-built Record Drawings.

E. The Fire Protection Subcontractor shall be responsible for generating as-built Record Drawings utilizing CAD based documents in AutoCAD Release 2000 DWG or DXF format. A bound set of plans, as well as the computer files, on disk, shall be turned over to the Architect for review. After acceptance of the as-built documents by the Architect, the Fire Protection Subcontractor shall make any corrections necessary to the as-built documents and prepare one reproducible set of drawings as well as bound blueprint set(s) (quantity as determined by the Architect) for distribution to the Owner via the Architect.

F. The Fire Protection Subcontractor may use the computer drawing files used for coordination drawings or purchase the Engineers most recently updated computer drawing files at a nominal charge of $500.00 per drawing file. The updated drawings may not include all changes made during the course of construction and it shall be the Fire Protection Subcontractors responsibility to update the as-built documents to include all changes brought forth to the project resulting from bulletins, request for information (RFI's), change orders, etc. The Fire Protection Subcontractor may review the Engineers latest computer files for completeness prior to purchase, however the Engineer will not be responsible for updating the computer files.

G. Included with the above shall be a complete drawing list and a standard layering system, which shall be required to be maintained within the as-built Record CAD documents.

H. The Fire Protection Subcontractor shall be issued bulletins in the same manner as the original Design Documents described above.

I. The as-built CAD documents required shall be in addition to other requirements stated elsewhere.

1.29 SAMPLES

A. Submit samples as requested by Architect.

1.30 GENERAL PRODUCT REQUIREMENTS

A. Products shall be undamaged and unused at time of installation and shall be complete with accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use.

B. Where available, products shall be standard products of types which have been produced and use previously and successfully on other projects and in similar applications.

C. Where products by their nature and their use are likely to need replacement parts on future date, for maintenance and repair or replacement work, products shall be standard domestically produced products likely to have such parts available to Owner in future.

D. Labels and stamps which are required for observation after installation shall be located on accessible surfaces which, in occupied spaces, are not conspicuous. Other labels and stamps shall be located on concealed surfaces.

1.31 COOPERATION AND WORK PROGRESS

A. The Fire Protection work shall be carried on under the usual construction conditions, in conjunction with all other work at the site. The Fire Protection Subcontractor shall cooperate with the Architect, General Contractor, all other Subcontractors and equipment suppliers working at the site. The Fire Protection

Subcontractor shall coordinate the work and proceed in a manner so as not to delay the progress of the project.

B. The Fire Protection Subcontractor shall coordinate his work with the progress of the building and other Trades so that he will complete his work as soon as conditions permit and such that interruptions of the building functions will be at a minimum. Any overtime hours worked or additional costs incurred due to lack of or improper coordination with other Trades or the Owner by the Fire Protection Subcontractor, shall be assumed by him without any additional cost to the Owner.

C. The Fire Protection Subcontractor shall furnish information on all equipment that is furnished under this Section but installed under another Section to the installing Subcontractor as specified herein.

D. The Fire Protection Subcontractor shall provide all materials, equipment and workmanship to provide for adequate protection of all Fire Protection equipment during the course of construction of the project. This shall also include protection from moisture and all foreign matter. The Fire Protection Subcontractor shall also be responsible for damage which he causes to the work of other Trades, and he shall remedy such injury at his own expense.

E. Waste materials shall be removed promptly from the premises. All material and equipment stored on the premises shall be kept in a neat and orderly fashion. Material or equipment shall not be stored where exposed to the weather. The Fire Protection Subcontractor shall be responsible for the security, safekeeping and damages, including acts of vandalism, of all material and equipment stored at the job site.

F. The Fire Protection Subcontractor shall be responsible for unloading all Fire Protection equipment and materials delivered to the site. This shall also include all large and heavy items or equipment which require hoisting. Consult with the General Contractor for hoisting/crane requirements. During construction of the building, the Fire Protection Subcontractor shall provide additional protection against moisture, dust accumulation and physical damage of the main service and distribution equipment. This shall include furnishing and installing temporary heaters within these units, as approved, to evaporate excessive moisture and ventilate it from the room, as may be required.

G. It shall be the responsibility of the Fire Protection Subcontractor to coordinate the delivery of the Fire Protection equipment to the project prior to the time installation of equipment will be required; but he shall also make sure such equipment is not delivered too far in advance of such required installation, to ensure that possible damage and deterioration of such equipment will not occur. Such equipment stored for an excessively long period of time (as determined in the opinion of the Architect) on the project site prior to installation may be subject to rejection by the Architect.

H. The Fire Protection Subcontractor shall erect and maintain, at all times, necessary safeguards for the protection of life and property of the Owner, Workmen, Staff and the Public.

I. Prior to installation, the Fire Protection Subcontractor has the responsibility to coordinate the exact mounting arrangement and location of Fire Protection equipment to allow proper space requirements as indicated in the NEC. Particular attention shall be given in the field to group installations. If it is questionable that sufficient space, conflict with the work of other Subcontractors, architectural or structural obstructions will result in an arrangement which will prevent proper access, operation or maintenance of the indicated equipment, the Fire Protection Subcontractor shall immediately notify the Contractor and not proceed with this part of the Contract work until definite instructions have been given to him by the Architect.

J. The Fire Protection Subcontractor shall obtain from the Plumbing, HVAC and Electrical Subcontractors copies of all shop drawing prints showing the ductwork and piping installation as they will be put in place on the project. These drawings shall be thoroughly checked by the Fire Protection Subcontractor be coordinated with the work of other trades so as to prevent any installation conflict.

1.32 INSTALLATION

A. General:

1. Unless specifically noted or indicated otherwise, all equipment and material specified in Division 21 of this specification or indicated on the drawings shall be installed under this Contract whether or not specifically itemized herein. This Section covers particular installation methods and requirements peculiar to certain items and classes or material and equipment.
2. The Fire Protection Subcontractor shall obtain detailed information from manufacturers of equipment as to proper methods of installation.
3. The Fire Protection Subcontractor shall obtain final roughing dimensions and other information as needed for complete installation of items furnished under other Sections or furnished by the Owner.
4. The Fire Protection Subcontractor shall keep fully informed of size, shape and position of openings required for material and equipment provided under this and other Sections. Ensure that openings required for work of this Section are coordinated with work of other Sections. Provide cutting, coring and patching as necessary.
5. All miscellaneous hardware and support accessories, including support rods, nuts, bolts, screws and other such items, shall be of a galvanized or cadmium plated finish or of another approved rust-inhibiting coating.
6. Throughout this Section where reference is made to steel channel supports, it shall be understood to mean that the minimum size shall be 1 5/8" mild strip steel with minimum wall thickness of 0.105", similar to Unistrut P1000 or equal products manufactured by Kindorf or Husky Products Co.

1.33 MATERIALS AND WORKMANSHIP

A. All materials and equipment shall be new and unused and shall meet requirements of the latest Standards of NEMA, UL, IPCEA, ANSI and IEEE. Equipment shall have components required or recommended by OSHA, applicable NFPA documents and shall be UL listed and labeled.

B. Despite references in the specifications or on the drawings to materials or pieces of equipment by name, make or catalog number, such references shall be interpreted as establishing standards of quality for materials and performance.

C. Finish of materials, components and equipment shall not be less than Industry good practice. When material or equipment is visible or subject to corrosive or atmospheric conditions, the finish shall be as approved by the Architect.

D. Provide proper access to material or equipment that requires inspection, replacement, repair or service. If proper access cannot be provided, confer with the Architect as to the best method of approach to minimize effects of reduced access.

E. All work shall be installed in a neat and workmanlike manner and shall be done in accordance with all Local and State Codes.

F. The Owner will not be responsible for material, equipment or the installation of same before testing and acceptance.

1.34 CLEANING

A. This Section of the specifications shall include the cleaning of all equipment on a day-to-day basis and final cleaning of all Fire Protection equipment prior to turning building over to the Owner. All necessary cleaning referred to herein shall be cleaned to the satisfaction of the Architect.

1.35 FINAL INSPECTION

A. When all Fire Protection work on the project has been completed and is ready for final inspection, such an inspection shall be made. At this time, and in addition to all other requirements in the Contract Documents, the Fire Protection Subcontractor, for the work under this Contract, shall demonstrate that the requirements of these specifications have been met to the Architect's satisfaction.

END OF SECTION 210100

SECTION 210513 - COMMON MOTOR REQUIREMENTS FOR FIRE SUPPRESSION EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

B. Related Sections:
   1. Section 210100 - Fire Protection General Requirements.
   2. Section 211316 – Dry-Pipe Sprinkler Systems.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

   1. Motor controllers.
   2. Torque, speed, and horsepower requirements of the load.
   3. Ratings and characteristics of supply circuit and required control sequence.
   4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 SINGLE-PHASE MOTORS

A. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

B. Motors 1/20 HP and Smaller: Shaded-pole type.

C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 210513

SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

B. Related Sections:
1. Section 099000 - Painting and Coating: Execution requirements for piping painting specified by this section.
2. Section 210100 - Fire Protection General Requirements.
3. Section 210518 – Escutcheons for Fire Suppression Piping.
4. Section 210523 – General Duty Valves, Pipe, Fittings and Hangers for Fire Suppression Systems.
5. Section 210548 – Vibration and Seismic Controls for Fire-Suppression Piping and Equipment.
6. Section 210553 - Identification for Fire Suppression Piping and Equipment.
7. Section 211313 – Wet-Pipe Sprinkler System.
8. Section 211316 – Dry-Pipe Sprinkler Systems.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 STACK-SLEEVE FITTINGS

A. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Manufacturers: provide products by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2-inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2-inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than 6-inches: Galvanized-steel wall sleeves Galvanized-steel-pipe sleeves.
b. Piping 6-inches and Larger: Galvanized-steel wall sleeves Galvanized-steel-pipe sleeves.

2. Exterior Concrete Walls below Grade:

a. Piping Smaller Than 6-inches: Cast-iron wall sleeves with sleeve-seal system Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

b. Piping 6-inches and Larger: Cast-iron wall sleeves with sleeve-seal system Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

a. Piping Smaller Than 6-inches: Cast-iron wall sleeves with sleeve-seal system Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

b. Piping 6-inches and Larger: Cast-iron wall sleeves with sleeve-seal system Galvanized-steel wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Interior Partitions:

a. Piping Smaller Than 6-inch: Galvanized-steel-pipe sleeves.
b. Piping 6-inches and Larger: Galvanized-steel-pipe sleeves.

END OF SECTION 210517

SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

B. Related Sections:
1. Section 099000 - Painting and Coating: Execution requirements for piping painting specified by this section.
2. Section 210100 - Fire Protection General Requirements.
3. Section 210517 – Sleeves and Sleeve Seals for Fire Suppression Piping.
4. Section 210523 – General Duty Valves, Pipe, Fittings and Hangers for Fire Suppression Systems.
5. Section 210548 – Vibration and Seismic Controls for Fire-Suppression Piping and Equipment.
6. Section 210553 - Identification for Fire Suppression Piping and Equipment.
7. Section 211313 – Wet-Pipe Sprinkler System.
8. Section 211316 – Dry-Pipe Sprinkler Systems.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Section 013300 - Submittal Procedures: Submittal procedures.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

D. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed and exposed-rivet hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
j. Bare Piping in Equipment Rooms: One-piece, cast-brass type with polished, chrome-plated finish.
k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 210518

SECTION 210523 - GENERAL-DUTY VALVES PIPES, FITTINGS AND HANGERS FOR FIRE-SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:
1. Section 099000 - Painting and Coating: Execution requirements for piping painting specified by this section.
2. Section 210100 - Fire Protection General Requirements.
3. Section 210517 – Sleeves and Sleeve Seals for Fire Suppression Piping.
4. Section 210518 – Escutcheons for Fire Suppression Piping.
5. Section 210548 – Vibration and Seismic Controls for Fire-Suppression Piping and Equipment.
6. Section 210553 - Identification for Fire Suppression Piping and Equipment.
7. Section 211313 – Wet-Pipe Sprinkler System.
8. Section 211316 – Dry-Pipe Sprinkler Systems.

1.2 SUMMARY

A. Section Includes:

1. Ball valves with indicators.
2. Butterfly valves with indicators.
3. Check valves.
4. OS&Y gate valves.
5. Non-rising stem gate valves.
6. Backflow preventer assemblies
7. Trim and drain valves.
8. Pipe and fittings.
9. Hangers.
10. Fire department connections.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
2. ASME B16.3 – Malleable Iron Threaded Fittings, Class 150 and 300.
3. ASME B16.4 - Cast Iron Threaded Fittings, Class 125 and 250.
4. ASME B16.5 - Pipe Flanges and Flanged Fittings
5. ASME B16.9 – Factory-made Wrought Steel Butt Welding Fittings.
6. ASME B16.11 - Forged Steel Fittings - Socket-Welding and Threaded.
7. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
8. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
9. ASME B16.25 – Butt Welding Ends.
10. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.
11. ASME Sec 9 - Welding and Brazing Qualifications.

B. American Society of Sanitary Engineers:
1. ASSE 1013 – Standard for Reduced Pressure Principal Backflow Preventer

2. ASSE 1015 – Standard for Double Check Backflow Preventer Assembly
3. ASSE 1047 – Standard for Reduced Pressure Detector Backflow Preventer
4. ASSE 1048 – Standard for Double Check Detector Assembly Backflow Preventer.

C. ASTM International:
1. ASTM A47 – Malleable Iron Castings.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A135 - Standard Specification for Electric-Resistance-Welded Steel Pipe.
4. ASTM A126 – Standard for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
5. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
6. ASTM A536 – Standard for Ductile Iron Casting.
7. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
8. ASTM B32 - Standard Specification for Solder Metal.
9. ASTM B75 - Standard Specification for Seamless Copper Tube.
10. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
11. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.

D. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.
3. AWS D10.9 - Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.

E. American Water Works Association:
1. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
2. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
3. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
4. AWWA C510 – Standard for Double Check Valve Backflow Prevention Assembly.
5. AWWA C511 – Standard for Reduced Pressure Principal Backflow Prevention Assembly.
6. AWWA C606 – Standard for Grooved and Shouldered Joints.

F. National Fire Protection Association:
1. NFPA 13 - Installation of Sprinkler Systems.
2. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.
3. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.

G. Underwriter Laboratories, Inc.:
1. UL 1887 - Fire Tests of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics.
2. UL - Fire Resistance Directory.

H. Factory Mutual:
1. FM - Factory Mutual Approval Guide.

1.4 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

C. Product Data: Submit manufacturer's catalogue information. Provide data on each valve, and fittings, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

D. Grooved joint couplings and fittings shall be shown on shop drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series designation.

E. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and all code requirements

1.5 CLOSE OUT SUBMITTALS

A. Section 017700 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of components and tag numbering.

C. Operation and Maintenance Data: Submit spare parts lists.

1.6 QUALITY ASSURANCE

A. Workmanship and Qualifications: All materials and equipment shall be installed in accordance with NFPA and all applicable local codes and ordinances. The Sprinkler Contractor shall be state licensed to install sprinkler systems. The Sprinkler Contractor shall make sure that all work and materials conform to the requirements set forth by this Specification. Fire protection equipment shall be installed to conform to NFPA as applicable, and devices used shall be listed and approved by Underwriters laboratories (UL) and/or Factory Mutual (FM).

B. Codes and Standards: All work shall be equal or superior to that required by codes, regulations, ordinances, and laws imposed by the jurisdictional authorities, including those of the State of Connecticut, State Fire Marshall, local ordinances and OSHA. Nothing in the Specifications permit violations of such directives, and where conflict occurs, the directive shall govern, except where superior work is specified or indicated.

C. In addition to complying with the above codes and regulations, comply with the requirements of the following:
1. NFPA Standard 13.
2. NFPA Standard 24.
3. State Building and Fire Codes.
4. Local Jurisdictional Authorities.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. Valves: Bear UL and/or FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

F. All items of similar class shall be the products of the same manufacturer. All valves, accessory items, etc., shall be from the same source.

G. Provide fire sprinkler piping located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with UL 1887.

H. Maintain one copy of each document on site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Furnish cast iron and steel valves with temporary protective coating
2. Protect internal parts against rust and corrosion.
3. Protect threads, flange faces, and weld ends.
4. Set valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Deliver and store valves in shipping containers, with labeling in place.
2. Maintain valve end protection, furnish cast iron and steel valves with temporary protective coating.
3. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
4. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.
5. All equipment, valves, gages etc., shall be covered and protected during the execution of the work. All equipment and piping shall be protected from freezing. Labeling to remain in place.

C. Protect flanges and specialties from moisture and dirt.

D. All unloading, hauling, and handling of materials shall be the responsibility of the Sprinkler Contractor.

E. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

F. The Sprinkler Contractor can obtain information on available storage space on site from the Owner when making examination of the site.

1.8 WARRANTEE

A. Section 017700 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five year manufacturer warranty for basic fire suppression materials and methods.

1.9 EXTRA MATERIALS

A. Section 017700 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two sets of valve stem packing for each size and type of valve installed.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. UL Listed: Valves shall be listed in UL's "Online Certifications Directory" and shall bear UL mark.

B. FM Global Approved: Valves shall be listed in its "Approval Guide," for Automatic Sprinkler Systems.

C. Source Limitations for Valves: Obtain valves for each valve type from single manufacturer.

D. ASME Compliance:

1. ASME B16.1 for flanges on iron valves.
2. ASME B1.20.1 for threads for threaded-end valves.
3. ASME B31.9 for building services piping valves.

E. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

F. NFPA Compliance: Comply with NFPA 13 for valves.

G. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher as required by system pressures.

H. Valve Sizes: Same as upstream piping unless otherwise indicated.

I. Valve Actuator Types:

1. Worm-gear actuator with hand wheel for quarter-turn valves, except for trim and drain valves.
2. Hand wheel: For other than quarter-turn trim and drain valves.
3. Hand lever: For quarter-turn trim and drain valves 2-inch and smaller.

2.2 VALVE MANUFACTURES

A. Description:
1. Kennedy Valve Mfg. Co.
2. Victaulic.
3. Stockham.
4. Nibco.
5. Watts.
6. Wilkins
7. Hammond.
8. Milwaukee.
9. Substitutions: Section 016000 - Product Requirements.

2.3 TWO-PIECE BALL VALVES WITH INDICATORS

A. Description:

1. UL 1091, except with ball instead of disc and FM Global standard for indicating valves (butterfly or ball type), Class Number 1112.
2. Minimum Pressure Rating: 175 psig.
3. Body Design: Two piece.
4. Body Material: Forged brass or bronze.
5. Port Size: Full or standard.
6. Seats: PTFE.
7. Stem: Bronze or stainless steel.
8. Ball: Stainless Steel.
9. Actuator: Worm gear or traveling nut.
10. Supervisory Switch: Internal or external.
11. End Connections for Valves 1-inch through 2-inch: Threaded ends.
12. End Connections for Valves 2-1/2-inch: Grooved ends.

2.4 BRONZE BUTTERFLY VALVES WITH INDICATORS

A. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 1112.
2. Minimum: Pressure rating: 175 psig.
3. Body Material: Bronze.
4. Seat Material: EPDM.
5. Stem Material: Bronze or stainless steel.
6. Disc: Ductile iron disc with EPDM coating.
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Ends Connections for Valves 1-inch through 2-inch: Threaded ends.
10. Ends Connections for Valves 2-1/2-inch: Grooved ends.

2.5 IRON BUTTERFLY VALVES WITH INDICATORS

A. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 112.
2. Minimum Pressure Rating: 175 psig.
3. Body Material: Cast or ductile iron.
4. Seat Material: EPDM.
5. Stem: Stainless steel.
6. Disc: Ductile iron, with EPDM coating.
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Body Design: Lug or grooved-end connections.

2.6 CHECK VALVES

A. Description, up to 2-inch:

1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 175 psig.
3. Type: Single swing check.
4. Body Material: bronze.
5. Clapper: Bronze, with elastomeric seal.
6. Clapper Seat: Brass, bronze, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: threaded.

B. Description, over 2-inch:

1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 175 psig.
3. Type: Single swing check.
4. Body Material: ductile iron.
5. Clapper: stainless steel with elastomeric seal.
6. Clapper Seat: stainless steel.

7. Hinge Shaft: stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged or grooved.

2.7 BRONZE OS&Y GATE VALVES

A. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Bronze or brass.
4. Wedge: One-piece bronze or brass.
5. Wedge Seat: Bronze.
6. Stem: Bronze or brass.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.8 IRON OS&Y GATE VALVES

A. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron, or bronze with elastomeric coating.
5. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Flanged or Grooved.

2.9 NRS GATE VALVES

A. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig.
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron with elastomeric coating.
5. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Flanged or Grooved.

2.10 BACKFLOW PREVENTERS

A. Detector-Check, Fire-Protection Backflow-Preventer Assemblies:
1. Standard: ASSE 1047 and is FM Global approved or UL listed.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 12 psig maximum, through middle third of flow range.
4. Size: Refer to Fire Protection Drawings.
5. Design Flow Rate: 500 gpm.
6. Pressure Loss at Design Flow Rate: 12 psig maximum.
7. Body: Cast iron with interior lining that complies with AWWA C550 or that is FDA approved.
8. End Connections: Flanged or Grooved.
9. Configuration: Designed for horizontal, straight-through configuration flow.
10. Accessories:

a. Valves: Outside-screw and yoke-gate type with flanged or Grooved ends on inlet and outlet.
b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.
c. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

B. Double-Check, Detector-Check Assembly Backflow Preventer Assemblies:
1. Standard: ASSE 1048 and is FM Global approved or UL listed.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: psig maximum, through middle third of flow range.
4. Size: Refer to Fire Protection Drawings.
5. Design Flow Rate: 500 gpm.
6. Pressure Loss at Design Flow Rate: 6 psig maximum.
7. Body: Cast iron with interior lining that complies with AWWA C550 or that is FDA approved.
8. End Connections: Flanged or Grooved.
9. Configuration: Designed for horizontal, straight-through configuration flow.
10. Accessories:

a. Valves: Outside-screw and yoke-gate type with flanged or Grooved ends on inlet and outlet.
b. Bypass: With displacement-type water meter, shutoff valves, and double check valve.

2.11 TRIM AND DRAIN VALVES

A. Ball Valves:
1. Description:

a. Pressure Rating: 175 psig.
b. Body Design: Two piece.
c. Body Material: Forged brass or bronze.
d. Port size: Full or standard.
e. Seats: PTFE.
f. Stem: Bronze or stainless steel.
g. Ball: stainless steel.
h. Actuator: Handlever.
i. End Connections for Valves 1-inch through 2-inch: Threaded ends.
j. End Connections for Valves 2-1/2-inch and over: Grooved ends.

B. Angle Valves:
1. Description:

a. Pressure Rating: 175 psig.
b. Body Material: Brass or bronze.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc: Bronze.
f. Packing: Asbestos free.
g. Hand wheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:
1. Description:

a. Pressure Rating: 175 psig.
b. Body Material: Bronze with integral seat and screw-in bonnet.
c. Ends: Threaded.
d. Stem: Bronze.
e. Disc Holder and Nut: Bronze.
f. Disc Seat: Nitrile.
g. Packing: Asbestos free.
h. Hand wheel: Malleable iron, bronze, or aluminum.

2.12 STEEL PIPE AND FITTINGS (WET PIPE)

A. Buried Piping:
1. Ductile Iron Pipe: ANSI/AWWA C151, cement lined.
a. Fittings: ANSI/AWWA C110, standard thickness.
b. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings.
c. Joints: ANSI/AWWA C111, rubber gasket.

B. Above Ground Piping:
1. Black-Steel Pipe: ASTM A 53/A 53M, schedule 40 seamless carbon steel. Pipe ends may be factory or field formed to match joining method.
2. Black-Steel Pipe: ASTM A 135/A 135M, or ASTM A 795/A 795M, Schedule 10 for pipe sizes 2-inch and larger; and NFPA 13-specified wall thickness in 6-inch to 10-inch, plain end.
3. Cast Iron Fittings: ANSI/ASME B16.1, flanges and flanged fittings; ANSI/ASME B16.4, screwed fittings.
4. Malleable Iron Fittings: ANSI/ASME B16.3, screwed Class 300 type. Threads shall conform to ANSI/ASTM A47.
5. Grooved Mechanical Fittings: ANSI A21.10/AWWA C-110 ductile iron; ASTM A536 Grade 65-45-12 ductile iron; ASTM A234 Grade WPB; or factory fabricated from carbon steel pipe conforming to ASTM A53; with grooves or shoulders designed to accept grooved end couplings. Fittings shall be of the same manufacturer as the adjoining couplings. Grooved Mechanical Couplings: ASTM A536 Grade 65-45-12, ductile iron housing, elastomer gasket with nuts and bolts to secure roll grooved pipe and fittings.
a. Rigid Type Couplings: Housings cast with offsetting, angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with NFPA-13.
1) 1-1/4” through 4”: Factory assembled for direct stab installation without field disassembly. Victaulic Style 009 EZ.
2) 5” through 8”: Victaulic FireLock™ Style 005.
3) 10” and larger: Victaulic Zero-Flex® Style 07.
b. Flexible Type Couplings: Use in locations where vibration attenuation and stress relief are required, and for seismic considerations in accordance with the manufacturer’s instructions. Victaulic Style 75.
6. All pipe installed on a dry pipe system shall be galvanized.

C. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating: 175-psig minimum.
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

2.13 STEEL PIPE AND FITTINGS (DRY PIPE)

A. Standard-Weight, Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

B. Schedule 40, Galvanized-Steel Pipe: ASTM A 135/A 135M; ASTM A 795/A 795M, Type E; or ASME B36.10M wrought steel, with wall thickness not less than Schedule 40. Pipe ends may be factory or field formed to match joining method.

C. Thin wall Galvanized-Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.

D. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

E. Galvanized-Steel Couplings: ASTM A 865/A 865M, threaded.

F. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

G. Malleable- or Ductile-Iron Unions: UL 860.

H. Cast-Iron Flanges: ASME B16.1, Class 125.

I. Grooved-Joint, Steel-Pipe Appurtenances:
   1. Pressure Rating: 175-psig minimum.
   2. Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.
   3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.14 UNIONS AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches (50 mm) and Under:
   1. Ferrous Piping: 150 psig (1034 kPa) malleable iron, threaded.
   2. Copper Pipe: Bronze, soldered joints.

B. Dielectric Connections: Union, waterway fitting, or flange with water impervious isolation barrier; Victaulic Style 47 or Watts 3000 Series or approved equal.

2.15 PIPE HANGERS AND SUPPORTS

A. Conform to NFPA 13 and NFPA 14.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.

C. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.

G. Vertical Support: Steel riser clamp.

H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.16 FIRE DEPARTMENT CONNECTION.

A. Fire department connection shall be chrome 5-inch Storz type connection. Provide with polished chrome identification plate.

B. The fire department connection shall be constructed of cast brass with brass clapper, brass swivel couplings and a brass hinge pin. The words “AUTO SPKR” and “F.D. Conn” shall be cast in raised letters on the body.

C. Fire department connection threads shall match the local fire departments standard.

D. Drain: 3/4-inch automatic drip, install at low point after check valve, pipe to building exterior.

E. Provide a 90-degree elbow with drain connection at each fire department connection to allow for drainage in areas exposed to the building exterior to prevent freezing. Elbow shall be Victaulic #10-DR.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate work of this Section with other affected work.

B. Ream pipe and tube ends. Remove burrs.

C. Remove scale and foreign material, from inside and outside, before assembly.

D. Prepare piping connections to equipment with flanges or unions.

3.2 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.3 INSTALLATION – GENERAL

A. Install in accordance with manufacturer's instructions.

B. The Contractor shall maintain a clean and orderly site during the installation of the sprinkler system. Materials shall not be stored in the halls or other public areas.

C. Cutting, welding and other hot work shall not be permitted without permission from the building owner. Contractor shall provide a fire watch for one hour after all welding.

D. The required tests shall be witnessed by the Fire Marshall, authority having jurisdiction, Owner's insurance underwriter and Architect/Engineer.

E. Pipe Hangers and Supports:
1. Install in accordance with NFPA 13.
2. Install hangers to with minimum 1/2-inch space between finished covering and adjacent work.
3. Place hangers within 12 inches of each horizontal elbow.
4. Use hangers with 1-1/2-inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
6. Where installing several pipes in parallel and at same elevation, provide multiple or trapeze hangers.
7. Prime coat exposed steel hangers and supports. Refer to Section 099000. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.4 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Pipe/insulation: All wet sprinkler piping must be plumbed on the heated side of the building insulation to prevent freezing. The fire protection contractor must install the wet sprinkler piping such that space is provided around all wet piping for insulation to be installed. The space required for insulation is dictated by the insulation R-value for the specific area as specified by the Architect.

C. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Use Victaulic Style 77 or 75 couplings in accordance with Victaulic instructions for expansion and contraction of pipe.

D. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.

E. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.

F. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

G. Install unions adjacent to each valve in pipes 2-inch and smaller.

H. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having 2-1/2-inch and larger end connections.

I. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

J. Pitch piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

K. Install sprinkler piping with drains for complete system drainage.

L. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

M. Place piping in concealed spaces above finished ceilings unless noted otherwise.

N. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

O. Install piping to conserve building space, to not interfere with use of space and other work.

P. Group piping whenever practical at common elevations.

Q. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 099000.

R. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

S. Do not penetrate building structural members unless indicated.

T. Install alarm devices in piping systems.

U. Provide surge restrainers on all end of branches and arm overs in excess of 12-inches.

V. Fill sprinkler system piping with water.

W. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. In seismic-rated areas, refer to Section 210548 "Seismic Controls for Fire-Suppression Piping and Equipment."

X. Pressurize and check drypipe sprinkler system piping, air-pressure maintenance devices and air compressors.

Y. Install pressure gages on riser or feed main, at each sprinkler test connection, Include pressure gages with connection not less than ¼-inch and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.

Z. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

AA. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

BB. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

CC. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with requirements for heating cables in Section 26000 "Heat Tracing for Fire-Suppression Piping" by Electrical Contractor and for piping insulation in Section 210700 by Fire Protection Contractor.

3.5 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes 2-inch and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having 2-1/2-inch and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Steel-Piping, Pressure-Sealed Joints: Join light wall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

I. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.

J. Grooved joint couplings and fittings shall be installed in accordance with the manufacturer's written installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be verified as suitable for the intended service prior to installation. Gaskets shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.

K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

M. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.6 GENERAL REQUIREMENTS FOR VALVE INSTALLATION

A. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

B. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above the pipe center.

D. Install valves in position to allow full stem movement.

E. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.

F. Install drain valves at main shut-off valves, low points of piping and apparatus.

G. All valves shall be accessible for operation and servicing. Provide access panels where required.

H. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.

I. Install gate valves for shut-off or isolating service.

J. Provide double check valve backflow preventer assembly at sprinkler system water source connection. Install a drain line from the air gap fitting and terminate at the nearest floor drain. The double check valve assembly shall not be installed at more than 5'0" above finished floor for maintenance.

3.7 SLEEVE INSTALLATION

A. Install sleeves in accordance with Specification Section 210517 – "Sleeves and Sleeve Seals for Fire Suppression Piping".

3.8 ESCUTCHEON INSTALLATION

A. Install escutcheons in accordance with Specification Section 210518 – "Escutcheons for Fire Suppression Piping".

3.9 FIRE DEPARTMENT CONNECTION

A. Locate fire department connection with sufficient clearance from walls, obstructions, etc., to allow full swing of fire department wrench handle. Coordinate the exact location of the fire department connection with the local fire officials. Installation shall conform to the local fire official's requirements.

3.10 PIPING SCHEDULE

A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends and cast-iron threaded fittings or grooved ends with grooved-end fittings and grooved-end-pipe couplings joints.

B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

C. Wet Pipe Sprinkler System:
   1. Standard-pressure, wet-pipe sprinkler system, 1 1/2-inch and smaller, shall be one of the following:
      a. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
      b. Type L, hard copper tube with plain ends; wrought-copper, solder-joint fittings; and brazed joints.
   2. Standard-pressure, wet-pipe sprinkler system, 2-inch to 4-inch, shall be one of the following:
      a. Schedule 40, black-steel pipe with cut-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
      b. Schedule 40, black-steel pipe with steel welding fittings; and welded joints.
      c. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
      d. Schedule 10 black-steel pipe with welding fittings; and welded joints.
   3. Standard-pressure, wet-pipe sprinkler system, 5-inch and larger shall be one of the following:
      a. Schedule 40, black-steel pipe with cut-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
      b. Schedule 40, black-steel pipe with steel welding fittings; and welded joints.
      c. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
   4. Standard-pressure, dry-pipe sprinkler system, 1 1/2-inch and smaller, shall be one of the following:
      a. Schedule 40, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
   5. Standard-pressure, dry-pipe sprinkler system, 2-inch to 4-inch, shall be one of the following:
      a. Schedule 40, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

b. Schedule 40, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
c. Schedule 10, galvanized-steel pipe with roll-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

D. Provide new fire service complete with double check valve backflow preventer assembly, and isolation valves with tamper switches.
1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
2. Provide Link Seal Modular Seal assembly Model C for temperature rating of -40°F to 250°F. Install per manufacturers written instructions.

3.11 TESTING

A. Piping: The complete system shall be subject to a pressure test, and to such other tests as the authorities having jurisdiction may require. The pressure test shall be a hydrostatic pressure of 200 pounds per square inch for a period of two hours. The above ground piping and attached appurtenances shall show no pressure loss or leaks, refer to NFPA Standard 13 Hydrostatic tests. For buried piping refer to NFPA Standard 24 Testing Underground Systems. Before applying specified test pressure, all air must be expelled from the system. All defects of whatever type shall be repaired or replaced to the satisfaction of the Owner and authorities having jurisdiction and at no additional cost to the Owner. Packing rings, special joint bolts, gaskets, and other material required for the proper installation of the pipe and fittings shall be provided. Testing shall be completed prior to permanent sealing of walls and partitions.

B. Leaks in mechanical joints shall be repaired by dismantling the joint, reassembling it, and tightening the bolts in the correct order. Leaks in screw or grooved joint shall be repaired by dismantling the joint and reassembling it. Attempting to repair leaks in joints by over tightening the bolts or fittings shall not be permitted

C. Upon satisfactory completion of all tests, the Contractor shall submit three copies of the Standard Contractors Material and Test Certificate to the Owner.

END OF SECTION 210523

SECTION 210548 - VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:
1. Section 210500 - Fire Protection General Requirements.
2. Section 210523 – General Duty Valves, Pipe, Fittings and Hangers for Fire Suppression Systems.
3. Section 211200 - Fire Suppression Standpipes.
4. Section 211313 – Wet-Pipe Sprinkler System.
5. Section 211316 – Dry-Pipe Sprinkler Systems.

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Pipe-riser resilient supports.
5. Resilient pipe guides.
6. Elastomeric hangers.
7. Snubbers.
8. Restraint channel bracings.
9. Seismic-restraint accessories.
10. Mechanical anchor bolts.
11. Adhesive anchor bolts.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning & Development (for the State of California).

1.4 SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.

a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction an evaluation service member of ICC-ES.
b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.

1. Include design calculations and details for selecting vibration isolators and seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by a qualified professional engineer.
2. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, due to seismic forces required to select vibration isolators, and due to seismic restraints.
3. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.
4. Seismic-Restraint Details:

a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

C. Information Submittals.

1. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for fire-suppression piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.
2. Qualification Data: For professional engineer.
3. Welding certificates.
4. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: [A] [B] [C] [D] [E] [F].
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: [I] [II] [III].

    a. Component Importance Factor: 1.0.
    b. Component Response Modification Factor: 2.5.
    c. Component Amplification Factor: 1.0.

3. Design Spectral Response Acceleration at Short Periods (0.2 Second): 1.5.
4. Design Spectral Response Acceleration at 1.0-Second Period: .6.
5. Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction an evaluation service member of ICC-ES.

    a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they are subjected.

2.2 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads:
1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
2. Size: Factory or field cut to match requirements of supported equipment.
3. Pad Material: Oil and water resistant with elastomeric properties.
4. Surface Pattern: Smooth Ribbed pattern.
5. Infused nonwoven cotton or synthetic fibers.
6. Load-bearing metal plates adhered to pads.
7. Sandwich-Core Material: Resilient and elastomeric.

    a. Surface Pattern: Smooth Ribbed pattern.
    b. Infused nonwoven cotton or synthetic fibers.

2.3 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts:
1. Mounting Plates:

a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

2. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.4 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts:
1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

a. Housing: Cast-ductile iron or welded steel.
b. Elastomeric Material: Molded, oil-resistant rubber, neoprene or other elastomeric material.

2.5 PIPE-RISER RESILIENT SUPPORT

A. Description: All-directional, acoustical pipe anchor consisting of two steel tubes separated by a minimum 1/2-inch-thick neoprene.

1. Vertical-Limit Stops: Steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions.
2. Maximum Load Per Support: 500 psig on isolation material providing equal isolation in all directions.

2.6 RESILIENT PIPE GUIDES

A. Description: Telescopic arrangement of two steel tubes or post-and-sleeve arrangement separated by a minimum 1/2-inch-thick neoprene.

1. Factory-Set Height Guide with Shear Pin: Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.7 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:
1. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
2. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.8 SNUBBERS

A. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
3. Maximum 1/4-inch air gap, and minimum 1/4-inch-thick resilient cushion.

2.9 RESTRAINT CHANNEL BRACINGS

A. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.10 SEISMIC-RESTRAINT ACCESSORIES

A. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or Reinforcing steel angle clamped to hanger rod.

B. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings.

C. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.11 MECHANICAL ANCHOR BOLTS

A. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.12 ADHESIVE ANCHOR BOLTS

A. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction an evaluation service member of ICC-ES.

B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete." and Section 033053 "Miscellaneous Cast-in-Place Concrete."

B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

C. Equipment Restraints:

1. Install seismic snubbers on fire-suppression equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction an evaluation service member of ICC-ES that provides required submittals for component.

D. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 12 feet.

E. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction an evaluation service member of ICC-ES that provides required submittals for component.

F. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

G. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

H. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

I. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 211200 "Fire-Suppression Standpipes," Section 211313 "Wet-Pipe Sprinkler Systems," and Section 211316 "Dry-Pipe Sprinkler Systems" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

END OF SECTION 210548

SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:
1. Section 210100 - Fire Protection General Requirements.
2. Section 210513 – Common Motor Requirements for Fire Suppression Equipment.
3. Section 210523 – General Duty Valves, Pipes, Fittings and Hangers for Fire Suppression Systems.
4. Section 211313 – Wet-Pipe Sprinkler System.
5. Section 211316 – Dry-Pipe Sprinkler Systems.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Stencils.
5. Valve tags.
6. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.

D. Valve Schedules: Valve numbering scheme.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch-thick, with predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.

4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
6. Fasteners: Stainless-steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment-Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8-inch-thick, with predrilled holes for attachment hardware.

B. Letter Color: White.

C. Background Color: Black.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction according to ASME A13.1.

B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Size letters according to ASME A13.1 for piping. Lettering shall be minimum of 1/2 inch.

E. Pipe-Label Colors:

1. Background Color: Safety Red.
2. Letter Color: White.

2.4 VALVE TAGS

A. Description: Stamped or engraved with 1/4-inch letters for piping-system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch-thick, with predrilled holes for attachment hardware.
2. Fasteners: Brass beaded chain or S-hook.
3. Valve-Tag Color: Safety Red.
4. Letter Color: White.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

A. Description: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Reinforced grommet and wire or string.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be installed.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Piping: Painting of piping is specified in Division 9.

B. Stenciled Pipe-Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit a view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes including pipes where flow is allowed in both directions.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in fire-suppression piping systems. List tagged valves in a valve-tag schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below:

1. Valve-Tag Size and Shape:

a. Wet-Pipe Sprinkler System: 1-1/2 inches, round.
b. Dry-Pipe Sprinkler System: 1-1/2 inches, round.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 210553

SECTION 210700 - FIRE-SUPPRESSION SYSTEMS INSULATION

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:
1. Section 210500 - Fire Protection General Requirements.
2. Section 210523 – General Duty Valves, Pipes, Fittings and Hangers for Fire Suppression Systems.
3. Section 211313 – Wet-Pipe Sprinkler System.

1.2 SUMMARY

A. Section Includes:

1. Insulating indoor engine coolant piping for remote radiator of engine-driven fire pump.
2. Insulating indoor engine exhaust piping and silencer.
3. Insulating indoor and outdoor equipment.
4. Insulating outdoor piping.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at pipe expansion joints for each type of insulation.
3. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.

C. Informational Submittals:

1. Qualification Data: For qualified Installer.
2. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
3. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields.

B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Calcium Silicate:

1. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
2. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

G. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Block Insulation: ASTM C 552, Type I.
2. Special-Shaped Insulation: ASTM C 552, Type III.
3. Board Insulation: ASTM C 552, Type IV.
4. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
5. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
6. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
2. Type II, 1200 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F.

1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
2. Service Temperature Range: Minus 50 to plus 220 deg F.
3. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
4. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.5 SEALANTS

A. Joint Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.7 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. SK Tape: FFoil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Width: 3 inches.
2. Thickness: 6.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Width: 2 inches.
2. Thickness: 6 mils.
3. Adhesion: 64 ounces force/inch in width.
4. Elongation: 500 percent.
5. Tensile Strength: 18 lbf/inch in width.

2.8 SECUREMENTS

A. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

B. Wire: 0.080-inch nickel-copper alloy 0.062-inch soft-annealed, stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.

3.4 PENETRATIONS

A. Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
6. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
7. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
8. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 CALCIUM SILICATE INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install two-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
4. Finish flange insulation same as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
3. Finish fittings insulation same as pipe insulation.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
2. Install insulation to flanges as specified for flange insulation application.
3. Finish valve and specialty insulation same as pipe insulation.

3.7 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and applicable insulation joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.8 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and applicable insulation joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 FINISHES

A. Equipment and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be

limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.

2. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.11 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed.

B. Fire-suppression water piping insulation shall be one of the following:

1. Cellular Glass: 2 inches thick.
2. Mineral-Fiber Board: 1-inch-thick and 3-lb/cu. ft. nominal density.

3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:
1. PVC: 30 mils thick.
2. Aluminum, Smooth: 0.032 inch thick.

END OF SECTION 210700

SECTION 211100 - FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:
1. Section 210100 - Fire Protection General Requirements.
2. Section 210517 – Sleeves and Sleeve Seals for Fire Suppression Piping.
3. Section 210518 – Escutcheons for Fire Suppression Piping.
4. Section 210548 – Vibration and Seismic Controls for Fire-Suppression Piping and Equipment.
5. Section 210553 - Identification for Fire Suppression Piping and Equipment.
6. Section 211313 – Wet-Pipe Sprinkler System.
7. Section 211316 – Dry-Pipe Sprinkler Systems.

1.2 SUMMARY

A. Section includes fire-suppression water-service piping and related components outside the building and service entrance piping through floor or through the foundation wall into the building and the following:

1. Pipes, fittings, and specialties.
2. Fire-suppression specialty valves.
3. Alarm devices.

B. Utility-furnished products include water meters that are furnished to the site, ready for installation.

C. Related Requirements:

1. Section 211119 "Fire-Department Connections" for exposed-, flush-, and yard-type, fire-department connections.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying the water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. 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. Comply with FM Global's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use hand-wheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Fire-Suppression Water-Service Piping: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify the Owner no fewer than five days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without the Owner's written permission.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS

A. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.

B. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end.

C. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end.

D. Grooved-End, Ductile-Iron Pipe Appurtenances:
1. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
2. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

E. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

1. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

F. Push-on-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.

1. Gaskets: AWWA C111, rubber.

G. Flanges: ASME B16.1, Class 125, cast iron.

2.2 SPECIAL PIPE FITTINGS

A. Ductile-Iron Flexible Expansion Joints:
1. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
2. Pressure Rating: 250 psig minimum.

B. Ductile-Iron Deflection Fittings:
1. Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
2. Pressure Rating: 250 psig minimum.

2.3 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Material: Linear low-density PE film of 0.008-inch minimum thickness or high-density, cross-laminated PE film of 0.004-inch minimum thickness.

C. Form: Sheet or tube.

D. Color: Black or natural.

2.4 JOINING MATERIALS

A. Gaskets for Ferrous Piping: ASME B16.21, asbestos free.

2.5 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Tubular-Sleeve Pipe Couplings:
1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners, and with ends of same sizes as piping to be joined.
2. Standard: AWWA C219.
3. Center-Sleeve Material: Ductile iron or Malleable iron.
4. Gasket Material: Natural or synthetic rubber.
5. Pressure Rating: 200 psig minimum.
6. Metal Component Finish: Corrosion-resistant coating or material.

2.6 CORPORATION VALVES

A. Corporation Valves: Comply with AWWA C800. Include saddle and valve compatible with tapping machine and manifold.

1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.

B. Meter Valves: Comply with AWWA C800 for high-pressure, service-line valves. Include angle- or straight-through-pattern bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

2.7 DETECTOR CHECK VALVES

A. Description: Galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.

B. Standards: UL 312 and FM Global's "Approval Guide."

C. Pressure Rating: 175 psig.

D. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.

2.8 DETECTOR-TYPE WATER METERS

A. AWWA, Detector Check Water Meters:

1. Description: Main line, turbine meter with second meter on bypass.
2. Standard: AWWA C703.
3. Registration: Flow in gallons cubic feet.
4. Pressure Rating: 150 psig.
5. Bypass Meter: AWWA C701, turbine AWWA C702, compound-type, bronze case.

    a. Size: At least one-half nominal size of main-line meter.

B. Fire-Protection, Detector Check Water Meters:

1. Description: Main-line turbine meter with strainer and second meter on bypass.
2. Standards: UL's "Fire Protection Equipment Directory" listing and FM Global's "Approval Guide."
3. Registration: Flow in gallons cubic feet.
4. Pressure Rating: 175 psig minimum.
5. Bypass Meter: AWWA C701, turbine-type, bronze case.

    a. Size: At least 2-inch.

C. Remote Registration System:

1. Description: Utility company's standard; direct-reading type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.
2. Standard: AWWA C706.
3. Registration: Flow in gallons cubic feet.

D. Remote Registration System:

1. Description: Utility company's standard; encoder type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.
2. Standard: AWWA C707.
3. Registration: Flow in gallons cubic feet.
4. Data-Acquisition Units: Comply with utility company's requirements for type and quantity.
5. Visible Display Units: Comply with utility company's requirements for type and quantity.

2.9 PRESSURE-REDUCING VALVES

A. Water Regulators:
1. Standard: ASSE 1003.
2. Pressure Rating: Initial pressure of 150 psig.
3. Size: 6-inch.
4. Design Flow Rate: 500 gpm.
5. Design Inlet Pressure: 50 psig.

6. Design Outlet Pressure Setting: 100 psig.
7. Body Material: Bronze for 2-inch and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for 2-1/2-inch and 3-inch.
8. End Connections: Threaded for 2-inch and smaller; flanged for 2-1/2 and 3-inch.

2.10 BACKFLOW PREVENTERS

A. Double-Check, Backflow-Prevention Assemblies:
1. Standard: ASSE 1015.
2. Operation: Continuous-pressure applications unless otherwise indicated.
3. Pressure Loss**:** 5 psig maximum, through middle one-third of flow range.
4. Size: 6-inch.
5. Design Flow Rate: 500- gpm.
6. Pressure Loss at Design Flow Rate: 10 psig for 2-inch and smaller; 14 psig for 2-1/2-inch and larger.
7. Body Material: Bronze for 2-inch and smaller; steel with interior lining complying with AWWA C550 for 2-1/2-inch and larger.
8. End Connections: Threaded for 2-inch and smaller; flanged for 2-1/2-inch and larger.
9. Configuration: Designed for horizontal, straight through flow.
10. Accessories: Ball valves with threaded ends on inlet and outlet of 2-inch and smaller; OS&Y gate valves with flanged ends on inlet and outlet of 2-1/2-inch and larger.

B. Double-Check, Detector-Assembly Backflow Preventers:
1. Standards: ASSE 1048 and UL's "Fire Protection Equipment Directory" listing or FM Global's "Approval Guide."
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 5 psig maximum, through middle one-third of flow range.
4. Size: 6-inch.
5. Design Flow Rate: 500 gpm.
6. Pressure Loss at Design Flow Rate: 14 psig.
7. Body Material: Steel with interior lining complying with AWWA C550.
8. End Connections: Flanged.
9. Configuration: Designed for horizontal, straight through flow.
10. Accessories:

    a. Valves: UL 262 and FM Global's "Approval Guide" listing; OS&Y gate type with flanged ends on inlet and outlet.
    b. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

C. Backflow Preventer Test Kits:
1. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.11 ALARM DEVICES

A. General: UL 753 and FM Global's "Approval Guide" listing, of types and sizes to mate and match piping and equipment.

B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig working pressure; designed for horizontal or vertical installation; with two single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-

adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.

C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.

D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with excavating, trenching, and backfilling requirements in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Water-Main Connection: Arrange with water utility company for tap of size and in location indicated in water main.

B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.

C. Make connections larger than 2-inch with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

D. Make connections 2-inch and smaller with drilling machine according to the following:

1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company's standards.
2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
4. Install corporation valves into service-saddle assemblies.
5. Install manifold for multiple taps in water main.
6. Install curb valve in water-service piping with head pointing up and with service box.

E. Comply with NFPA 24 for fire-service-main piping materials and installation.

F. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

1. Install encasement for piping according to ASTM A 674 or AWWA C105.

G. Bury piping with depth of cover over top at least 60 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

1. Under Driveways: With at least 60 inches of cover over top.
2. Under Railroad Tracks: With at least 72 inches of cover over top.
3. In Loose Gravelly Soil and Rock: With at least 12 inches of additional cover.

H. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

I. Extend fire-suppression water-service piping and connect to water-supply source and building fire-suppression water-service piping systems at locations and pipe sizes indicated.

1. Terminate fire-suppression water-service piping within the building at the floor slab or foundation wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building's fire-suppression water-service piping systems when those systems are installed.

J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

K. Comply with requirements for fire-suppression water-service piping inside the building in the following Sections:

1. Section 211313 "Wet-Pipe Sprinkler Systems
2. Section 211316 "Dry-Pipe Sprinkler Systems"

L. Comply with requirements in Section 221116 "Domestic Water Piping" for potable-water piping inside the building.

M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

3.3 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure rating same as or higher than systems pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in tubing 2-inch and smaller.

C. Install flanges, flange adaptors, or couplings for grooved-end piping on valves, apparatus, and equipment having 2-1/2-inch and larger end connections.

D. Ream ends of tubes and remove burrs.

E. Remove scale, slag, dirt, and debris from outside and inside of pipes, tubes, and fittings before assembly.

F. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.

G. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts.

H. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with bolts according to ASME B31.9.

I. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.

J. Do not use flanges or unions for underground piping.

3.4 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches in fire-suppression water-service piping according to NFPA 24 and the following:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.5 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

C. UL-Listed or FM Global-Approved Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

D. UL-Listed or FM Global-Approved Valves Other Than Gate Valves: Comply with NFPA 24.

E. MSS Valves: Install as component of connected piping system.

F. Pressure-Reducing Valves: Install in vault or aboveground between shutoff valves.

G. Support valves and piping, not direct buried, on concrete piers. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete." Section 033053 "Miscellaneous Cast-in-Place Concrete."

3.6 DETECTOR CHECK VALVE INSTALLATION

A. Install in vault or aboveground.

B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.

C. Support detector check valves and piping on concrete piers. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete." Section 033053 "Miscellaneous Cast-in-Place Concrete."

3.7 BACKFLOW PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.

C. Do not install bypass piping around backflow preventers.

D. Support 2-1/2-inch and larger backflow preventers and piping on concrete piers. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete." Section 033053 "Miscellaneous Cast-in-Place Concrete."

3.8 FIRE-DEPARTMENT CONNECTION INSTALLATION

A. Install ball drip valves at each check valve for fire-department connection to mains.

B. Install protective pipe bollards on two sides of each freestanding fire-department connection. Pipe bollards are specified in Section 055000 "Metal Fabrications."

3.9 ALARM DEVICE INSTALLATION

A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.

B. Supervisory Switches: Supervise valves in open position.

1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.

C. Locking and Sealing: Secure unsupervised valves as follows:

1. Valves: Install chain and padlock on open OS&Y gate valve.
2. Post Indicators: Install padlock on wrench on indicator post.

D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.

E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.

F. Connect alarm devices to building's fire-alarm system. Wiring and fire-alarm devices are specified in Section 284621.11 "Addressable Fire-Alarm Systems."

3.10 CONNECTIONS

A. Connect fire-suppression water-service piping to utility water main existing water main. Use tapping sleeve and tapping valve.

B. Connect fire-suppression water-service piping to interior fire-suppression piping.

C. Connect waste piping from concrete vault drains to waste water system.

3.11 FIELD QUALITY CONTROL

A. Use test procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described below.

B. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

C. Hydrostatic Tests: Test at not less than one-and-one-half times the working pressure for two hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to zero psig. Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

D. Prepare test and inspection reports.

3.12 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground fire-suppression water-service piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic fire-suppression water-service piping or fire-suppression water-service piping with electrically insulated fittings, on main electrical meter panel. Comply with requirements for identifying devices in Section 210553 "Identification for Fire Suppression Piping and Equipment."

3.13 CLEANING

A. Clean and disinfect fire-suppression water-service piping as follows:

1. Purge new piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow it to stand for 24 hours.
b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow it to stand for three hours.
c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

3.14 PIPING SCHEDULE

A. Underground fire-suppression water-service piping up to 4-inches shall be one of the following:
1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and gasketed joints.
2. Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and gasketed joints.

B. Underground fire-suppression water-service piping 6-inches and over shall be one of the following:
1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and gasketed joints.
2. Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and gasketed joints.

C. Aboveground and vault fire-suppression water-service piping up to 4-inches shall be the following:
1. Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

D. Aboveground and vault fire-suppression water-service piping 6-inches and over shall be the following:
1. Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

E. Underslab fire-suppression water-service piping up to 4-inches shall be one of the following:
1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and restrained, gasketed joints.
2. Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and restrained, gasketed joints.

F. Underslab fire-suppression water-service piping 6-inches and over shall be one of the following:
1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and restrained, gasketed joints.
2. Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and restrained, gasketed joints.

3.15 VALVE SCHEDULE

A. Underground fire-suppression water-service shutoff valves shall be corporation valves or curb valves with ends compatible with piping.

B. Meter box fire-suppression water-service shutoff valves shall be meter valves.

C. Vault fire-suppression water-service shutoff valves shall be Class 125, MSS, bronze, nonrising stem or UL-listed or FM Global-approved, OS&Y, bronze, gate valves.

D. Underground fire-suppression water-service shutoff valves shall be one of the following:
   1. 175-psig, UL-listed or FM Global-approved, iron, nonrising-stem gate valves.

E. Standard-pressure, aboveground and vault fire-suppression water-service shutoff valves shall be one of the following:
   1. 175-psig, UL-listed or FM Global-approved, iron, OS&Y gate valves.

F. Fire-suppression water-service check valves shall be one of the following:

   1. AWWA and UL-listed or FM Global-approved check valves.
   2. UL-listed or FM Global-approved detector check valves.

END OF SECTION 211100

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1. Section 210100 “Fire Protection General Requirements”.
2. Section 210517 “Sleeves and Sleeve Seals for Fire Suppression Piping”.
3. Section 210518 “Escutcheons for Fire Suppression Piping”.
4. Section 210523 "General-Duty Valves, Pipe and Fittings for Water-Based Fire-Suppression Piping" for ball, butterfly, check, gate, post-indicator, and trim and drain valves.
5. Section 210548 “Vibration and Seismic Controls for Fire Suppression Piping and Equipment”.
6. Section 210553 Identification for Fire Suppression Piping and Equipment”.

1.2 SUMMARY

A. Section Includes:
1. Specialty valves.
2. Sprinklers.
3. Alarm devices.
4. Pressure gages.
5. Specialties.

1.3 DEFINITIONS

A. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig, but not higher than 250 psig.

B. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.4 REFERENCES

A. National Fire Protection Association:
1. NFPA 13 - Installation of Sprinkler Systems.
2. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.

B. Underwriter Laboratories, Inc.:
1. UL - Fire Resistance Directory.

C. Factory Mutual:
1. FM - Factory Mutual Approval Guide.

1.5 SYSTEM DESCRIPTION

A. Provide a wet pipe system hydraulically designed in accordance with NFPA 13 and all requirements of the local Authority Having Jurisdiction.

B. System to provide coverage for the entire building areas indicated on the Fire Protection Drawings.

C. Provide system to NFPA Standard occupancy requirements as noted on the drawings.

D. Hydraulic data and water supply information shall be as noted on the drawings.

E. Interface system with building fire alarm system.

F. The sprinkler locations and piping arrangements indicated on the contract documents are diagrammatic. It is the responsibility of the contractor to fully coordinate sprinkler and piping locations with all other trades.

G. Sprinkler locations indicated on the Contract Documents indicate sprinkler coverage utilizing standard coverage sprinklers maximum 225 square feet per sprinkler for light hazard and 130 square feet per sprinkler for ordinary hazard. Extended coverage sprinklers shall not be installed in any locations unless specifically indicated on the Contract Document drawings.

H. All sprinklers installed in a light hazard classification occupancy shall be a listed quick response type.

I. Provide fire department connections as indicated on Drawings.

J. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.6 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. Available fire-hydrant flow test records indicate the following conditions:

a. Refer to fire protection drawings.

C. Sprinkler system design shall be approved by authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent @ 10 psi, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications:

a. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
b. General Storage Areas: Ordinary Hazard, Group 1.
c. Laundries: Ordinary Hazard, Group 1.
d. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
e. Office and Public Areas: Light Hazard.

f. Residential Living Areas: Light Hazard.
g. Restaurant Service Areas: Ordinary Hazard, Group 1.

3. Minimum Density for Automatic-Sprinkler Piping Design:

a. Residential (Dwelling) Occupancy: 0.05 gpm over 400-sq. ft. area.
b. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
c. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
d. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
e. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. area.
f. Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. area.
g. Special Occupancy Hazard: As determined by authorities having jurisdiction.

D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.7 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Where the terms “authorities having jurisdiction” is used, within this Specification, it is intended to include the Insurance Underwriter and all regulatory agencies having vested interest in this project.

C. Shop Drawings:
1. Provide fire protections shop drawings drawn to a minimum scale of ¼” =1’-0”. Indicate pipe materials used, joining methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
2. Provide hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls.
3. All sprinkler drawings and calculations shall bear the seal of a Professional Engineer licensed in the State of New York. Seal and signature shall not be copied and shall be provided as an original drawing and each calculation.
4. Sprinklers shall be as shown on drawings and submittals and shall be specifically identified with the applicable style or series designation as published in the appropriate agency listing or approval. Trade names or other abbreviated designations are not permitted.
5. Working plans, prepared according to NFPA 13.
6. Sprinkler Contractor shall conduct a hydrant flow test. This flow data shall be used for the Sprinkler Contractor’s hydraulic calculations. Coordinate flow test requirements with the water company. All fees associated with the flow test shall be paid for by the Sprinkler Contractor.

D. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

E. After successful review by the Engineer, submit sprinkler layout shop drawings, product data, hydraulic calculations to authority having jurisdiction, Fire Marshall, and Owner's insurance underwriter for approval. Submit proof of approval to Architect/Engineer.

F. Grooved joint couplings and fittings shall be shown on shop drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series designation.

G. Manufacturer’s Certificate: Certify that system has been tested and meets or exceeds specified requirements and all code requirements.

H. Provide submittals for information purposes:
1. Qualification Data: For qualified Installer and professional engineer**.**
2. Welding certificates.
3. Fire-hydrant flow test report.
4. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
5. Field quality-control reports.

1.8 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Domestic water piping.
2. HVAC hydronic piping.
3. Items penetrating finished ceiling including the following:
a. Lighting fixtures.
b. Air outlets and inlets.

B. Qualification Data: For qualified Installer and professional engineer.

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

D. Fire-hydrant flow test report.

E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

F. Field quality-control reports.

1.9 CLOSEOUT SUBMITTALS

A. Section 017700 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

C. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals. Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.10 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by

NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.11 QUALITY ASSURANCE

A. Workmanship and Qualifications: All materials and equipment shall be installed in accordance with NFPA and all applicable local codes and ordinances. The Sprinkler Contractor shall be state licensed to install sprinkler systems. The Sprinkler Contractor shall make sure that all work and materials conform to the requirements set forth by this Specification. Fire protection equipment shall be installed to conform to NFPA as applicable, and devices used shall be listed and approved by Underwriters laboratories (UL) and/or Factory Mutual (FM).

B. Codes and Standards: All work shall be equal or superior to that required by codes, regulations, ordinances, and laws imposed by the jurisdictional authorities, including those of the State of Connecticut, State Fire Marshall, local ordinances and OSHA. Nothing in the Specifications permit violations of such directives, and where conflict occurs, the directive shall govern, except where superior work is specified or indicated.

C. In addition to complying with the above codes and regulations, comply with the requirements of the following:
   1. NFPA Standard 13.
   2. NFPA Standard 24.
   3. State Building and Fire Codes.
   4. Local Jurisdictional Authorities.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. Valves: Bear UL and/or FM label or marking. Provide manufacturer’s name and pressure rating marked on valve body.

F. All items of similar class shall be the products of the same manufacturer. All valves, accessory items, etc., shall be from the same source.

G. Maintain one copy of each applicable NFPA standard on site.

H. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

I. Installer: Company specializing in performing work of this Section with minimum five years experience.

J. Design sprinkler system under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State where the project is located.

K. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

L. Provide sprinklers system hydraulic calculations with a 10% safety factor.

M. Maximum pipe velocity for hydraulic calculations shall be 18 feet per second (FPS).

1.12 FIELD CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Owner's written permission.

1.13 DELIVERY, STORAGE AND HANDLING

A. Section 016000 - Product Requirements: Product storage and handling requirements.

B. Deliver and store products in shipping containers, with labeling in place.

C. All equipment, valves, gages and etc., shall be covered and protected during the execution of the work. All equipment and piping shall be protected from freezing. Labeling to remain in place.

D. All unloading, hauling, and handling of materials shall be the responsibility of the Sprinkler Contractor.

E. The Sprinkler Contractor can obtain information on available storage space on site from the Owner when making examination of the site.

1.14 WARRANTY

A. Section 017700 - Execution and Closeout Requirements: Product warranties and product bonds.

1.15 EXTRA MATERIALS

A. Section 017700 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish extra sprinklers under provisions of NFPA 13.

C. Furnish suitable wrenches for each sprinkler type.

D. Provide metal storage cabinet adjacent to the sprinkler riser.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.2 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating:

1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. Manufactures:
1. Viking.
2. Tyco.
3. Victaulic.
4. Grinnell Corp.
5. Reliable Sprinkler Corp.

G. Alarm Valves:
1. Check type valve with Nitrile seat o-ring aluminum bronze clapper with EPDM seal to automatically actuate electrically and hydraulically operated alarms, with pressure retard chamber and variable pressure trim. Valve internal components shall be replaceable without removing valve from the installed position. Valve shall be Series 751 as manufactured by Victaulic Co or engineer approved equal.
2. Provide retard chamber as part of wet alarm valve trim to allow for pressure fluctuations. Retard chamber shall be Victaulic Series 752 or engineer approved equal by manufacturers listed above. Provide all other trim as recommended by the manufacturer
3. Alarm check valve assembly shall allow discharge of one or more sprinklers to activate electric and hydraulic alarms
4. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

2.3 SPRINKLER PIPING SPECIALTIES

A. Manufactures:
1. Potter.
2. Potter-Roemer.
3. System Sensor.
4. Victaulic.
5. Viking.

B. Flow Detection and Test Assemblies:
1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:
1. Standard: UL 199.
2. Pressure Rating: 175 psig.
3. Body Material: Brass.
4. Size: Same as connected piping.
5. Inlet: Threaded.

6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:
1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig.
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:
1. Standard: UL 1474.
2. Pressure Rating: 250-psig minimum.
3. Body Material: Steel pipe with EPDM-rubber O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

F. Flexible Sprinkler Hose Fittings:
1. Standard: UL 1474.
2. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
3. Pressure Rating: 175-psig minimum.
4. Size: Same as connected piping, for sprinkler.

2.4 SPRINKLERS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating for Residential Sprinklers: 175-psig maximum.

C. Pressure Rating for Automatic Sprinklers: 175-psig minimum.

D. Manufacturers:
1. Viking.
2. Tyco.
3. Victaulic.
4. Grinnell Corp.
5. Reliable Sprinkler Corp.

E. All sprinklers shall be adjustable, glass bulb, automatic sprinklers with ½ inch orifice and 5.6 K-factor unless noted otherwise. Type of sprinkler head shall be as indicated on the plans and in accordance with section 211313.

F. Sprinkler bodies shall be die-cast brass, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.

G. Unless noted otherwise, ordinary temperature rated sprinkler heads shall be used throughout the building.

H. Where sprinklers will be installed in close proximity to heat sources and special locations, as identified in NFPA 13, temperature ratings shall be in accordance with the requirements of NFPA 13.

I. Where plans call for extended coverage sprinkler heads coordinate coverage requirements with required pressure and K-factor.

J. Spare Sprinklers: The Sprinkler Contractor shall furnish spare automatic sprinklers in accordance with the requirements of NFPA for stock of extra sprinklers. The sprinklers shall be packed in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. The Sprinkler Contractor shall furnish no less than two special sprinkler wrenches, or at least one wrench for each container or sprinkler box, whichever is greater.

K. In areas where sprinkler heads are subject to physical damage, provide sprinkler guard assembly over head, finish to match sprinkler finish. This shall include but not limited to the following locations.
1. Heads in elevator shafts.
2. Heads under lower rakes of stairways.
3. Heads in electrical rooms, boiler rooms and other mechanical rooms.
4. Heads installed 7'-0" or less above finished floors.
5. Heads in gymnasium/fitness center areas.

L. Sprinklers shall be in accordance with the following table:

Sprinkler Type	Sprinkler Finish	Manufacturer/Model Number
Pendent Type Sprinklers	Chrome plated finish with chrome plated surface escutcheon	Reliable Model F156
Upright Type Sprinklers	Brass finish.	Reliable Model F156.
Semi-recessed Pendent Type Sprinkler	Chrome plated finish with chrome plated adjustable semi-recessed escutcheon	Reliable Model F156
Concealed Type Sprinklers	Brass finish with factory painted white cover plate.	Reliable Model G4
Sidewall Type Sprinklers	Chrome plated finish with chrome plated, adjustable, semi-recessed escutcheon.	Reliable Model F156
Quick-response Pendent and Upright Type Sprinklers	Chrome plated finish with chrome plated adjustable semi-recessed escutcheon	Reliable Model F1FR
Quick-response Sidewall Type Sprinklers	Chrome plated finish with chrome plated adjustable semi-recessed escutcheon	Reliable Model F1FR
Quick-response Concealed Type Sprinklers	Brass finish with factory painted white cover plate.	Reliable Model G5-56
Dry Pendent Type Sprinklers	Chrome plated finish with chrome plated adjustable semi-recessed escutcheon	Reliable F3
Dry Horizontal Sidewall Type Sprinklers	Chrome plated finish with chrome plated, adjustable, semi-recessed escutcheon.	Reliable Model F3
Quick-response Dry Pendent Type Sprinkler	Chrome plated finish with chrome plated adjustable semi-recessed escutcheon	Reliable Model F3QR
Quick-response Dry Horizontal Sidewall Type	Chrome plated finish with chrome plated, adjustable,	Reliable Model DH56 HSW FP

Sprinklers	semi-recessed escutcheon.	

2.5 ALARM DEVICES

A. Manufacturers:
1. Potter.
2. Potter-Roemer.
3. System Sensor.
4. Victaulic.
5. Viking.

B. Alarm-device types shall match piping and equipment connections.

C. Water-Motor-Operated Alarm:
1. Standard: UL 753.
2. Type: Mechanically operated, with Pelton wheel.
3. Alarm Gong: Cast aluminum with red-enamel factory finish.
4. Size: 8-1/2-inches diameter.
5. Components: Shaft length, bearings, and sleeve to suit wall construction.
6. Inlet: NPS 3/4.
7. Outlet: NPS 1 drain connection.

D. Electrically Operated Alarm Bell:
1. Standard: UL 464.
2. Type: Vibrating, metal alarm bell.
3. Size: 8-inch diameter.
4. Finish: Red-enamel factory finish, suitable for outdoor use.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

E. Water-Flow Indicators:
1. Standard: UL 346.
2. Water-Flow Detector: Electrically supervised.
3. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
4. Type: Paddle operated.
5. Pressure Rating: 250 psig.
6. Design Installation: Horizontal or vertical.

F. Pressure Switches:
1. Standard: UL 346.
2. Type: Electrically supervised water-flow switch with retard feature.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design Operation: Rising pressure signals water flow.

G. Valve Supervisory Switches:
1. Standard: UL 346.
2. Type: Electrically supervised.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design: Signals that controlled valve is in other than fully open position.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

2.6 PRESSURE GAGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch diameter.

C. Pressure Gage Range: 0- to 250-psig minimum.

D. Label: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

C. Coordinate work of this Section with other affected work.

D. Prepare piping connections to equipment with grooved joint couplings, flanges, or unions.

3.2 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements of NFPA 24.

B. Provide double check valve backflow preventer assembly at sprinkler system water source connection. Install a drain line from the air gap fitting and terminate at the nearest floor drain. The backflow preventer shall be installed at a minimum height to allow installation of the air gap fitting, but shall not be installed at more than 5’0” above finished floor for maintenance.

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Installation of Alarm Valves: Install a drain line from the drain connection to the nearest floor drain. Install a test line from the test connection to the exterior of the building. Provide a splash block. Provide gate valves at each line. Minimum alarm valve riser shall be 4-inch.

D. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

E. Locate outside alarm gong on building wall as indicated.

F. Coordinate flow switches, tamper switches, and all other sprinkler devices with the fire alarm system.

3.4 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels, provide pipe off-sets as required.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

D. Sprinkler Bulb protector must remain in place until the sprinkler is completely installed. Remove the bulb protector by hand after installation and before the system is placed in service. (Do not use any tools to remove the bulb protector).

E. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.

3.5 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Install identification for fire protection systems in accordance with Section 210553 “Identification for Fire Suppression Piping and Equipment”.

C. Provide and apply signs to control, drain, test and alarm valves to identify their purpose and function. Provide and permanently attach hydraulic calculations data nameplate at the controlling valve for the sprinkler system. Provide lettering size and style from NFPA’s suggested styles.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Verify that equipment hose threads are same as local fire department equipment.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish. Remove after painting. Replace painted sprinklers with new.

3.7 CLEANING

A. Flush entire piping system of foreign matter.

B. Clean dirt and debris from sprinklers.

C. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.8 TESTING

A. The required tests shall be witnessed by the Fire Marshall, authority having jurisdiction, Owner's insurance underwriter and Architect/Engineer.

B. Section 210523 - General Duty Valves Pipe and Fittings and hangers for Fire Suppression Systems.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative **to** train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.10 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Concealed sprinklers Recessed Pendent sprinklers.
3. Wall Mounting: Sidewall sprinklers.
4. Spaces Subject to Freezing: Upright sprinklers Pendent, dry sprinklers and Sidewall, dry sprinklers.
5. Special Applications: Extended-coverage, flow-control, and quick-response sprinklers where indicated, Combustible concealed space sprinklers.

END OF SECTION 211313

SECTION 211316 - DRY-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1. Section 210100 “Fire Protection General Requirements”.
2. Section 210513 “Common Motor Requirements for Fire Suppression Equipment”.
3. Section 210517 “Sleeves and Sleeve Seals for Fire Suppression Piping”.
4. Section 210518 “Escutcheons for Fire Suppression Piping”.
5. Section 210523 "General-Duty Valves, Pipe and Fittings for Water-Based Fire-Suppression Piping" for ball, butterfly, check, gate, post-indicator, and trim and drain valves.
6. Section 210548 “Vibration and Seismic Controls for Fire Suppression Piping and Equipment”.
7. Section 210553 Identification for Fire Suppression Piping and Equipment”.

1.2 SUMMARY

A. Section Includes:
1. Specialty valves.
2. Sprinkler specialty pipe fittings.
3. Sprinklers.
4. Alarm devices.

1.3 DEFINITIONS

A. High-Pressure Sprinkler Piping: Dry-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig, but not higher than 250 psig.

B. Standard-Pressure Sprinkler Piping: Dry-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.4 REFERENCES

A. National Fire Protection Association:
1. NFPA 13 - Installation of Sprinkler Systems.
2. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.

B. Underwriter Laboratories, Inc.:
1. UL - Fire Resistance Directory.

C. Factory Mutual:
1. FM - Factory Mutual Approval Guide.

1.5 SYSTEM DESCRIPTIONS

A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from opened sprinklers.

B. System to provide coverage for the building areas indicated on the Fire Protection Drawings.

C. Provide system to NFPA Standard occupancy requirements as noted on the drawings.

D. Hydraulic data and water supply information shall be provided.

E. Interface system with building fire alarm system.

F. The sprinkler locations and piping arrangements indicated on the contract documents are diagrammatic. It is the responsibility of the contractor to fully coordinate sprinkler and piping locations with all other trades.

G. Sprinkler locations indicated on the Contract Documents indicate sprinkler coverage utilizing standard coverage sprinklers maximum 225 square feet per sprinkler for light hazard and 130 square feet per sprinkler for ordinary hazard. Extended coverage sprinklers shall not be installed in any locations unless specifically indicated on the Contract Document drawings.

H. All sprinklers installed in a light hazard classification occupancy shall be a listed quick response type.

I. Provide fire department connections as indicated on Drawings.

J. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.6 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1. Available fire-hydrant flow test records indicate the following conditions:

a. SUNY Purchase College physical plant Department.

C. Sprinkler system design shall be approved by authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications:

a. Automobile Parking Areas: Ordinary Hazard, Group 1.
b. Building Service Areas: Ordinary Hazard, Group 1.
c. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
d. General Storage Areas: Ordinary Hazard, Group 1.
e. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.

f. Office and Public Areas: Light Hazard.
g. Restaurant Service Areas: Ordinary Hazard, Group 1.

3. Minimum Density for Automatic-Sprinkler Piping Design:

a. Residential (Dwelling) Occupancy: 0.05 gpm over 400-sq. ft. area.
b. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
c. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
d. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
e. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. area.
f. Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. area.
g. Special Occupancy Hazard: As determined by authorities having jurisdiction.

4. Maximum Protection Area per Sprinkler: Per UL listing.
5. Maximum Protection Area per Sprinkler:

a. Residential Areas: 225 sq. ft.
b. Office Spaces: 225 sq. ft.
c. Storage Areas: 130 sq. ft.
d. Mechanical Equipment Rooms: 130 sq. ft.
e. Electrical Equipment Rooms: 130 sq. ft.
f. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

6. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:

a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.
c. Extra-Hazard Occupancies: 500 gpm for 90 to 120 minutes.

D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.7 SUBMITTALS

A. Section 013300 - Submittal Procedures: Submittal procedures.

B. Where the terms “authorities having jurisdiction” is used, within this Specification, it is intended to include the Insurance Underwriter and all regulatory agencies having vested interest in this project.

C. Shop Drawings:
1. Provide fire protections shop drawings drawn to a minimum scale of ¼” =1’-0”. Indicate pipe materials used, joining methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
2. Provide hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls.
3. All sprinkler drawings and calculations shall bear the seal of a Professional Engineer licensed in the State of New York. Seal and signature shall not be copied and shall be provided as an original drawing and each calculation.
4. Sprinklers shall be as shown on drawings and submittals and shall be specifically identified with the applicable style or series designation as published in the appropriate agency listing or approval. Trade names or other abbreviated designations are not permitted.
5. Working plans, prepared according to NFPA 13.

6. Sprinkler Contractor shall conduct a hydrant flow test. This flow data shall be used for the Sprinkler Contractor's hydraulic calculations. Coordinate flow test requirements with the water company. All fees associated with the flow test shall be paid for by the Sprinkler Contractor.

D. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

E. After successful review by the Engineer, submit sprinkler layout shop drawings, product data, hydraulic calculations to authority having jurisdiction, Fire Marshall, and Owner's insurance underwriter for approval. Submit proof of approval to Architect/Engineer.

F. Grooved joint couplings and fittings shall be shown on shop drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series designation.

G. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and all code requirements.

H. Provide submittals for information purposes:
1. Qualification Data: For qualified Installer and professional engineer**.**
2. Welding certificates.
3. Fire-hydrant flow test report.
4. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
5. Field quality-control reports.

1.8 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Domestic water piping.
2. HVAC hydronic piping.
3. Items penetrating finished ceiling including the following:

a. Lighting fixtures.
b. Air outlets and inlets.

B. Qualification Data: For qualified Installer and professional engineer.

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

D. Fire-hydrant flow test report.

E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

F. Field quality-control reports.

1.9 CLOSEOUT SUBMITTALS

A. Section 017700 - Execution and Closeout Requirements: Closeout procedures

B. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations

C. Operation and Maintenance Data: For dry-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals. Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.10 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.11 QUALITY ASSURANCE

A. Workmanship and Qualifications: All materials and equipment shall be installed in accordance with NFPA and all applicable local codes and ordinances. The Sprinkler Contractor shall be state licensed to install sprinkler systems. The Sprinkler Contractor shall make sure that all work and materials conform to the requirements set forth by this Specification. Fire protection equipment shall be installed to conform to NFPA as applicable, and devices used shall be listed and approved by Underwriters laboratories (UL) and/or Factory Mutual (FM).

B. Codes and Standards: All work shall be equal or superior to that required by codes, regulations, ordinances, and laws imposed by the jurisdictional authorities, including those of the State of New York, State Fire Marshall, local ordinances and OSHA. Nothing in the Specifications permit violations of such directives, and where conflict occurs, the directive shall govern, except where superior work is specified or indicated.

C. In addition to complying with the above codes and regulations, comply with the requirements of the following:
1. NFPA Standard 13.
2. NFPA Standard 24.
3. State Building and Fire Codes.
4. Local Jurisdictional Authorities.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. Valves: Bear UL and/or FM label or marking. Provide manufacturer’s name and pressure rating marked on valve body.

F. All items of similar class shall be the products of the same manufacturer. All valves, accessory items, etc., shall be from the same source.

G. Maintain one copy of each applicable NFPA standard on site.

H. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

I. Installer: Company specializing in performing work of this Section with minimum five years experience.

J. Design sprinkler system under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State where the project is located.

K. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

L. Provide sprinklers system hydraulic calculations with a 10% safety factor.

M. Maximum pipe velocity for hydraulic calculations shall be 18 feet per second (FPS).

1.12 FIELD CONDITIONS

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without Owner's written permission.

1.13 DELIVERY, STORAGE AND HANDLING

A. Section 016000 - Product Requirements: Product storage and handling requirements.

B. Deliver and store products in shipping containers, with labeling in place.

C. All equipment, valves, gages etc., shall be covered and protected during the execution of the work. All equipment and piping shall be protected from freezing. Labeling to remain in place.

D. All unloading, hauling, and handling of materials shall be the responsibility of the Sprinkler Contractor.

E. The Sprinkler Contractor can obtain information on available storage space on site from the Owner when making examination of the site.

1.14 WARRANTY

A. Section 017700 - Execution and Closeout Requirements: Product warranties and product bonds.

1.15 EXTRA MATERIALS

A. Section 017700 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish extra sprinklers under provisions of NFPA 13.

C. Furnish suitable wrenches for each sprinkler type.

D. Provide metal storage cabinet adjacent to the sprinkler riser.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.2 SPECIALTY VALVES

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating:

1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.

C. Body Material: Cast or ductile iron.

D. Size: Same as connected piping.

E. End Connections: Flanged or grooved.

F. Dry-Pipe Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Globe Fire Sprinkler Corporation.
    b. Reliable Automatic Sprinkler Co., Inc. (The).
    c. Tyco Fire & Building Products LP.
    d. Victaulic Company.
    e. Viking Corporation.

2. Standard: UL 260.

3. Design: Differential-pressure type.
4. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
5. Air-Pressure Maintenance Device:

6. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Globe Fire Sprinkler Corporation.
    b. Reliable Automatic Sprinkler Co., Inc. (The).
    c. Tyco Fire & Building Products LP.
    d. Victaulic Company.
    e. Viking Corporation.

7. Standard: UL 260.

8. Type: Automatic device to maintain minimum air pressure in piping.
9. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and 175-psig [**300-psig]** outlet pressure.
10. Air Compressor:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Gast Manufacturing Inc.
        2) General Air Products, Inc.
        3) Viking Corporation.

    b. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
    c. Motor Horsepower: Fractional.
    d. Power: 120-V ac, 60 Hz, single phase.

G. Automatic (Ball Drip) Drain Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Reliable Automatic Sprinkler Co., Inc. (The).
    b. Tyco Fire & Building Products LP.

2. Standard: UL 1726.

3. Pressure Rating: 175-psig minimum.
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4.
6. End Connections: Threaded.

2.3 SPRINKLER PIPING SPECIALTIES

A. Manufacturers:
1. Potter.
2. Potter-Roemer.
3. System Sensor.
4. Victaulic.
5. Viking.
6. Tyco.
7. Elkhart Brass.
8. Croker Corp.

B. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating: 175-psig minimum.
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.

6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

C. Flow Detection and Test Assemblies:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

D. Branch Line Testers:

1. Standard: UL 199.
2. Pressure Rating: 175-psig minimum.
3. Body Material: Brass.
4. Size: Same as connected piping.
5. Inlet: Threaded.
6. Drain Outlet: Threaded and capped.
7. Branch Outlet: Threaded, for sprinkler.

E. Sprinkler Inspector's Test Fittings:

1. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
2. Pressure Rating: 175-psig minimum.
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

F. Adjustable Drop Nipples:

1. Standard: UL 1474.
2. Pressure Rating: 250-psig minimum.
3. Body Material: Steel pipe with EPDM O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

2.4 SPRINKLERS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."

B. Pressure Rating for Residential Sprinklers: 175-psig maximum.

C. Pressure Rating for Automatic Sprinklers: 175-psig minimum.

D. Manufacturers:
1. Viking.
2. Tyco.
3. Victaulic.
4. Grinnell Corp.
5. Reliable Sprinkler Corp.

E. All sprinklers shall be adjustable, glass bulb, automatic sprinklers with ½ inch orifice and 5.6 K-factor unless noted otherwise. Type of sprinkler head shall be as indicated on the plans and in accordance with section 211313.

F. Sprinkler bodies shall be die-cast brass, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.

G. Unless noted otherwise, ordinary temperature rated sprinkler heads shall be used throughout the building.

H. Where sprinklers will be installed in close proximity to heat sources and special locations, as identified in NFPA 13, temperature ratings shall be in accordance with the requirements of NFPA 13.

I. Where plans call for extended coverage sprinkler heads coordinate coverage requirements with required pressure and K-factor.

J. Spare Sprinklers: The Sprinkler Contractor shall furnish spare automatic sprinklers in accordance with the requirements of NFPA for stock of extra sprinklers. The sprinklers shall be packed in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. The Sprinkler Contractor shall furnish no less than two special sprinkler wrenches, or at least one wrench for each container or sprinkler box, whichever is greater.

K. In areas where sprinkler heads are subject to physical damage, provide sprinkler guard assembly over head, finish to match sprinkler finish. This shall include but not limited to the following locations.
1. Heads in elevator shafts.
2. Heads under lower rakes of stairways.
3. Heads in electrical rooms, boiler rooms and other mechanical rooms.
4. Heads installed 7’-0” or less above finished floors.
5. Heads in gymnasium/fitness center areas.

L. Special Coatings: Wax, lead and corrosion-resistant paint.

M. Sprinklers shall be in accordance with the following table:

Sprinkler Type	Sprinkler Finish	Manufacturer/Model Number
Upright Type Sprinklers	Brass finish.	Reliable Model F156.
Quick-response Upright Type Sprinklers	Chrome plated finish with chrome plated adjustable semi-recessed escutcheon	Reliable Model F1FR
Dry Pendent Type Sprinklers	Chrome plated finish with chrome plated adjustable semi-recessed escutcheon	Reliable F3
Dry Horizontal Sidewall Type Sprinklers	Chrome plated finish with chrome plated, adjustable, semi-recessed escutcheon.	Reliable Model F3
Quick-response Dry Pendent Type Sprinkler	Chrome plated finish with chrome plated adjustable semi-recessed escutcheon	Reliable Model F3QR
Quick-response Dry Horizon-tal Sidewall Type Sprinklers	Chrome plated finish with chrome plated, adjustable, semi-recessed escutcheon.	Reliable Model DH56 HSW FP

2.5 ALARM DEVICES

A. Manufacturers:
1. Potter.
2. Potter-Roemer.
3. System Sensor.
4. Victaulic.
5. Viking.

B. Alarm-device types shall match piping and equipment connections.

C. Water-Motor-Operated Alarm:

1. Standard: UL 753.
2. Type: Mechanically operated, with Pelton wheel.
3. Alarm Gong: Cast aluminum with red-enamel factory finish.
4. Size: 10-inch diameter.
5. Components: Shaft length, bearings, and sleeve to suit wall construction.
6. Inlet: NPS 3/4.
7. Outlet: NPS 1 drain connection.

D. Electrically Operated Alarm Bell:

1. Standard: UL 464.
2. Type: Vibrating, metal alarm bell.
3. Size: 8-inch minimum diameter.
4. Finish: Red-enamel factory finish, suitable for outdoor use.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA70, by a qualified testing agency, and marked for intended location and application.

E. Pressure Switches:

1. Standard: UL 346.
2. Type: Electrically supervised water-flow switch with retard feature.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design Operation: Rising pressure signals water flow.

F. Valve Supervisory Switches:

1. Standard: UL 346.
2. Type: Electrically supervised.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design: Signals that controlled valve is in other than fully open position.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

2.6 MANUAL CONTROL STATIONS

A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" for hydraulic operation, with union, NPS 1/2 pipe nipple, and bronze ball valve.

B. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.7 PRESSURE GAGES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AGF Manufacturing Inc.
2. AMETEK, Inc.
3. Ashcroft Inc.
4. Brecco Corporation.
5. WIKA Instrument Corporation.

B. Standard: UL 393.

C. Dial Size: 3-1/2- to 4-1/2-inch diameter.

D. Pressure Gage Range: 0- to 250-psig minimum.

E. Label: Include "WATER" or "AIR/WATER" label on dial face.

F. Air System Piping Gage: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

C. Coordinate work of this Section with other affected work.

D. Prepare piping connections to equipment with grooved joint couplings, flanges, or unions.

3.2 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements of NFPA 24.

B. Provide double check valve backflow preventer assembly at sprinkler system water source connection. Install a drain line from the air gap fitting and terminate at the nearest floor drain. The backflow preventer shall be installed at a minimum height to allow installation of the air gap fitting, but shall not be installed at more than 5’0” above finished floor for maintenance.

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 WATER-SUPPLY CONNECTIONS

A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 221116 "Domestic Water Piping."

B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements in Section 221119 "Domestic Water Piping Specialties" for backflow preventers.

C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.4 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Installation of Dry Pipe Valves: Install a drain line from the drain connection to the nearest floor drain. Install a test line from the test connection to the exterior of the building. Provide a splash block. Provide gate valves at each line. Minimum alarm valve riser shall be 4-inch

D. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

E. Locate outside alarm gong on building wall as indicated.

F. Coordinate flow switches, tamper switches, and all other sprinkler devices with the fire alarm system.

G. Specialty Valves:

1. Install valves in vertical position for proper direction of flow, in main supply to system.
2. Install dry-pipe valves with trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

    a. Install air compressor and compressed-air-supply piping.
    b. Install air-pressure maintenance device with shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig adjustable range; and 175-psig maximum inlet pressure.
    c. Install compressed-air-supply piping from building's compressed-air piping system.

3.5 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels, provide pipe off-sets as required.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Sprinkler Bulb protector must remain in place until the sprinkler is completely installed. Remove the bulb protector by hand after installation and before the system is placed in service. (Do not use any tools to remove the bulb protector).

D. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.

3.6 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Provide and apply signs to control, drain, test and alarm valves to identify their purpose and function. Provide and permanently attach hydraulic calculations data nameplate at the controlling valve for the sprinkler system. Provide lettering size and style from NFPA's suggested styles.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Start and run air compressors.
6. Coordinate with fire-alarm tests. Operate as required.
7. Verify that equipment hose threads are same as local fire department equipment.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

D. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish. Remove after painting. Replace painted sprinklers with new.

3.8 CLEANING

A. Flush entire piping system of foreign matter.

B. Clean dirt and debris from sprinklers.

C. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.9 TESTING

A. The required tests shall be witnessed by the Fire Marshall, authority having jurisdiction, Owner's insurance underwriter and Architect/Engineer.

B. Section 210523 - General Duty Valves Pipe and Fittings and hangers for Fire Suppression Systems.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.11 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Dry pendent sprinklers, Dry recessed sprinklers, Dry flush sprinklers Dry concealed sprinklers, Dry pendent, recessed, flush, and concealed sprinklers as indicated.
3. Wall Mounting: Dry sidewall sprinklers.
4. Spaces Subject to Freezing: Upright sprinklers, Dry pendent sprinklers, Dry sidewall sprinklers.
5. Special Applications: Extended-coverage and quick-response sprinklers where indicated.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
4. Upright, Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211316

SECTION 220100 - PLUMBING GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. All of the Contract Documents as listed on the Table of Contents and including General and Supplementary Conditions and Division 1 - General Requirements shall be included in and made part of this Section.

1.2 DESCRIPTION OF WORK

A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.

B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division. Where conflicts exist between the drawings and the specifications or between this section of the specifications and other sections, the more stringent or higher cost option shall apply.

C. The work under this Contract shall include all labor, materials, tools, equipment, transportation, insurance, temporary protection, supervision and incidental items essential for proper installation and operation, even though not specifically mentioned or indicated on the drawings, but which are usually provided or are essential for proper installation and operation, of all systems as indicated on the drawings and specified herein.

D. The specifications and drawings describe the minimum requirements that must be met by the Plumbing Subcontractor for the installation of all work as shown on the drawings and as specified herein under.

E. Coordinate work with that of all other Trades affecting or affected by the work of this Section. Cooperate with such Trades to assure the steady progress of all work under the Contract.

1.3 INTENT

A. It is the intent of the Contract Documents to require finished work, tested and ready for operation.

B. It is not intended that Contract Documents show every pipe, fitting and appurtenance; however, such parts as may be necessary to complete the systems in accordance with best trade practice and Code requirements and to Architect’s satisfaction shall be deemed to be included.

C. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. DO NOT SCALE THE DRAWINGS.

1.4 DEFINITIONS

A. Words in the singular shall also mean and include the plural, wherever the context so indicates, and words in the plural shall mean the singular, wherever the context so indicates.

B. “Acceptable”: Acceptable, as determined in the opinion of the Architect.

C. The term “Acceptable equivalent” or “Equal”: Of weight, size, design, capacity and efficiency to meet requirements specified and shown, and of acceptable manufacturer, as determined in the opinion of the Architect.

D. "Accessible": Indicates ease of access with or without the use of ladders and without requiring extensive removal of other equipment, such as ductwork, piping, etc. to gain access. "Accessible ceiling" indicates acoustic tile type hung ceilings. Concealed spline or sheetrock ceilings with access panels shall not be considered accessible ceilings.

E. "Approved", or "Approval": Shall mean the written approval of the Architect

F. "Architect": Shall refer to the Architect: “Phase Zero Design” and/or the Engineer "Innovative Engineering Services, LLC.”

Commented [j1]: Add Project Architect Name Here

G. “Concealed”: Hidden from site, embedded in masonry or other construction; or installed in furred spaces, trenches or crawl spaces; or installed within double partitions or hung ceilings; or in enclosures.

H. The term "Contract Documents": Shall mean the entire set of Drawings and Specifications as listed in the Table of Contents of the General Conditions including all bound and unbound material and all items officially issued to date such as addenda, bulletins, job modifications, etc.

I. “Contractor”: General Contractor.

J. The term "Directed", "Required", "Permitted", "Ordered", "Designated", "Prescribed", and similar words: Shall mean the direction, requirement, permission, order, designation or prescription of the Architect; the terms "Approved", "Acceptable", "Satisfactory", and similar words shall mean approved by, acceptable or satisfactory to the Architect; and, the terms "Necessary", "Reasonable", "Proper", "Correct", and similar words shall mean necessary, reasonable, proper or correct in the judgment of the Architect.

K. “Exposed”: Visible to building occupants, excluding mechanical room and utility tunnel locations.

L. The term “Furnish” or “Supply”: Shall mean purchase, deliver to, and off-load at the job site, ready to be installed including where appropriate all necessary interim storage and protection.

M. The term “Finished”: Refers to all rooms and areas to be specified to receive architectural treatment as indicated on the drawings. All rooms and areas not covered, including underground tunnels and areas above ceilings shall be considered not finished, unless otherwise noted.

N. The term “Indicated”: Refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

O. “Installed”: Shall mean set in place complete with all mounting facilities and connections as necessary ready for normal use or service.

P. "Material": Is used in the specifications it will mean any "Product", "Equipment", "Device", "Assembly", or "Item" required under the Contract, as indicated by trade or brand name, manufacturer's name, standard specification reference or other description.

Q. “Named” Product: Manufacturer’s name for product, as recorded in published documents of latest issue as of date of Contract Documents. Obtain Architect’s permission before using products of later or earlier model.

R. "Owner": Shall refer to the Owner: “Purchase College State University of New York” or designated representative.

Commented [j2]: Add Owners Name Here

S. "Other Work Contractor" (O.W.C.): Refers to the Contractor(s), or Subcontractor(s) performing work under other Sections of the Contract Documents.

T. "Plumbing Subcontractor": Refers to the Subcontractor responsible for furnishing and installation of all work indicated on the Plumbing drawings and in the Plumbing specifications.

U. “Product”: Shall mean any item of equipment, material, fixture, apparatus, appliance or accessory installed under this Division.

V. "Provide": Is used in the specifications it will mean "Furnish" and "Install", "Connect", "Apply", Erect", "Construct", or similar terms, unless otherwise indicated in the specifications.

W. The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work

X. The term “Remove” means to disconnect from its present position, remove from the premises and to dispose of in a legal manner.

Y. The term "Shown on Drawings": Is used in the specifications, they shall mean "Noted", "Indicated", "Scheduled", "Detailed", or any other diagrammatic or written reference made on the drawings

Z. The term “Special Warranties” Are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

AA. "Specification": Shall mean all information contained in the bound or unbound volume, including all "Contract Documents" defined therein, except for the drawings.

BB. The term “Standard Product Warranties” Are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

CC. “Substitution”: Requests for changes in products, materials, equipment, and methods of construction proposed by the Contractor are considered requests for "Substitutions”.

DD. “Wiring”: Shall mean cable assembly, raceway, conductors, fittings and any other necessary accessories to make a complete wiring system.

EE. “Work”: Labor, materials, equipment, apparatus, controls and accessories required for proper and complete installation.

1.5 RELATED WORK

A. For work to be included as part of this Section, to be furnished and installed by the Plumbing Subcontractor, refer to the following Sections:

Commented [j3]: Edit Specific for Project

1.	Section 220516	Expansion Fittings and Loops for Plumbing Piping
2.	Section 220517	Sleeves and Sleeve Seals for Plumbing Piping
3.	Section 220518	Escutcheons for Plumbing Piping
4.	Section 220519	Meters and Gauges for Plumbing Piping
5.	Section 220523	General Duty Valves for Plumbing Piping
6.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
7.	Section 220548	Vibration and Seismic Controls for Plumbing Piping and Equipment
8.	Section 220553	Identification for Plumbing Piping and Equipment
9.	Section 220719	Plumbing Piping Insulation
10.	Section 221116	Domestic Water Piping
11.	Section 221119	Domestic Water Piping Specialties
12.	Section 221125	Natural Gas Piping
13.	Section 221316	Sanitary Waste and Vent Piping
14.	Section 221319	Sanitary Waste Pipe Specialties
15.	Section 221413	Facility Storm Drainage Piping

16. Section 221423 Storm Drainage Piping Specialties
17. Section 224300 Plumbing Fixtures
18. Section 226659 Kitchen Gas Safety Device Systems

B. For work related to, and to be coordinated with the Plumbing work, but not included in this Section and required to be performed under other designated Sections, see the following:

1. Division 1 Section “General Commissioning Requirements” to Plumbing construction.
2. Division 4 Section “Masonry Work” for Plumbing construction.
3. Division 7 Section “Fire stopping”.
4. Division 7 Section “Caulking, Flashing, Waterproofing, Roofing and setting of Roof Drains”.
5. Division 8 Section “Access Panels”.
6. Division 9 Section “Painting”.

1.6 DRAWINGS

A. The Contract Drawings are diagrammatic only intending to show general runs and locations of the ductwork, piping, equipment, systems equipment, etc. and not necessarily showing all required offsets, details and accessories and equipment to be connected. All work shall be accurately laid out with other Trades to avoid conflicts and to obtain a neat and workmanlike installation which will afford maximum accessibility for operation, maintenance and headroom.

B. Where discrepancies in scope of work as to what Trade provides items, such conflicts shall be reported to the Architect during bidding and prior to signing of the Contract. If such action is not taken, the Plumbing Subcontractor shall furnish such items as part of his work as necessary, for complete and operable systems and equipment, as determined by the Architect.

C. The Plumbing Subcontractor shall coordinate the installation of all equipment.

D. Where drawing details, plans, specification requirements and/or scheduled equipment capacities are in conflict or equipment are shown to be different between plans and/or between plans and riser diagrams, details or specifications, the most stringent requirement will be included in the Contract. Plumbing systems and equipment called for in the specification and/or shown on the drawings shall be provided under this Contract as if it were required by both the drawings and specifications. However, prior to ordering or installation of any portion of work which appears to be in conflict, such work shall be brought to Architect's attention for direction as to what is to be provided.

1.7 CODES AND STANDARDS

A. All materials and workmanship shall comply with all applicable Codes, Specifications, Local and State Ordinances, Industry Standards and Utility Company Regulations, latest editions.

B. In case of difference between Building Codes, State Laws, Local Ordinances, Industry Standards and Utility Company Regulations and the Contract Documents, the Plumbing Subcontractor shall promptly notify the Architect in writing of any such difference.

C. In case of conflict between the Contract Documents and the requirements of any Code or Authorities having jurisdiction, the most stringent requirements of the aforementioned shall govern.

D. Should the Plumbing Subcontractor perform any work that does not comply with the requirements of the applicable Building Codes, State Laws, Local Ordinances, Industry Standards and Utility Company Regulations, he shall bear all costs arising in correcting the deficiencies, as approved by the Architect/Owner.

E. Applicable Codes and Standards shall include all State Laws, Local Ordinances, Utility Company Regulations, and the applicable requirements of the latest adopted edition of the following Codes and Standards, without limiting the number, as follows:

1. International Building Code Latest Adopted Edition and Amendments of The State of New York.
2. International Existing Building Code Latest Adopted Edition and Amendments of The State of New York.
3. International Plumbing Code Latest Adopted Edition and Amendments of The State of New York.
4. International Fuel Gas Code Latest Adopted Edition and Amendments of The State of New York.
5. International Fire Code Latest Adopted Edition and Amendments of The State of New York.
6. The State of New York 2017 Uniform Code Supplement.
7. NFPA 70: National Electrical Code Latest Adopted Edition and Amendments of The State of New York.
8. NFPA 101: Life Safety Code Latest Adopted Edition and Amendments of The State of New York.
9. Occupational Safety and Health Administration, (OSHA).
10. Department of Environmental Protection, (DEP)
11. Local Building Code.

F. In these specifications, references made to the following Industry Standards and Code Bodies are intended to indicate the latest volume or publication of the Standard. All equipment, materials and details of installation shall comply with the requirements and latest revisions of the following Bodies, as applicable:

ANSI:	American National Standards Institute
ASTM/ASME:	American Society of Testing Materials
ASSE:	American Society of Sanitary Engineers
AWS:	American Welding Society
AWWA:	American Water Works Association
NEMA:	National Electrical Manufacturers Association
NFPA:	National Fire Protection Association
UL:	Underwriters' Laboratories
NBS:	National Bureau of Standards
NSC:	National Safety Council

G. Plumbing Subcontractor for the work in his scope of work shall give all necessary notices, obtain all permits, pay all governmental taxes, fees and other costs in connection with his work; file for necessary approvals with the jurisdiction under which the work is to be performed. Plumbing Subcontractor shall obtain all required Certificates of Inspection for his respective work and deliver same to the Architect before request for acceptance of his portion of work is made and before final payment.

1.8 PERMITS AND FEES

A. Plumbing Subcontractor for the work in his scope of work shall give all necessary notices, obtain all permits, pay all governmental taxes, fees and other costs in connection with his work; file for necessary approvals with the jurisdiction under which the work is to be performed. Plumbing Subcontractor shall obtain all required Certificates of Inspection for his respective work and deliver same to the Architect before request for acceptance of his portion of work is made and before final payment.

1.9 QUALITY ASSURANCE

A. The manufacturers listed within these specifications have been preselected for use on this project. No submittal will be accepted from a manufacturer other than specified.

B. Plumbing Subcontractor shall furnish and install all equipment, accessories, connections and incidental items necessary to fully complete the work under his Contract for use, occupancy and operation by the Owner.

C. Where equipment of a substitute manufacturer differ from that specified and require different arrangement or connections from those shown, it shall be the responsibility of the Subcontractor responsible for the substitution to modify the installation of the equipment/system to operate properly and in harmony with the original intent of the drawings and specifications. When directed by the Architect, the Plumbing Subcontractor shall submit drawings showing the proposed, substitute installation. If the proposed installation is accepted, the Plumbing Subcontractor shall make all necessary changes in all affected related work provided under his and other Sections including location of roughing-in connections by other Trades, supports, etc. All changes shall be made at no increase in the Contract amount or additional cost to the Owner. The General Contractor shall be responsible to assure that the Subcontractor responsible for the substitution bears the cost arising to all other Trades as a result of the substitution.

D. Unless specifically indicated otherwise, all equipment and materials required for installation under these specifications shall be new, unused and without blemish or defect. Equipment and materials shall be products which will meet with the acceptance of the Authorities having jurisdiction over the work and as specified hereinbefore. Where such acceptance is contingent upon having the products listed and/or labeled by FM or UL or another testing laboratory, the products shall be so listed and/or labeled. Where no specific indication as to the type or quality of material or equipment is indicated, a first class standard article shall be provided.

1.10 SUBSTITUTIONS

A. Contractor shall pay Architect/Engineer for time spent reviewing substitution requests. Charges shall be $120/hour. Submittal of substitution request will be construed as evidence of Contractor's agreement to pay such charges, with no added cost to Owner.

B. Contractor's request for substitution may be submitted only after award of Contract. Requests shall be in writing on Contractor's letterhead and shall include:

1. Contractor's detailed comparison of significant qualities between specified item and proposed substitution.

2. Statement of effect on construction time, coordination with other affected work, and cost information or proposal.
3. Contractor's statement to the effect that proposed substitution will result in overall work equal to, or better than, work originally intended.

C. Substitution requests will be considered: If extensive revisions to Contract Documents are not required; if changes are in keeping with general intent of Contract Documents; if submitted in timely and proper manner, fully documented; and if one or more of following conditions is satisfied; all as judged by Architect:

1. Where request is directly related to "acceptable equivalent" clause, "or equal" clause or words of similar effect in Contract Documents.
2. Where specified product, material or method cannot be provided within Contract Time; but not as a result of Contractor's failure to pursue the work promptly or to coordinate various activities properly.
3. Where specified product, material or method cannot be provided in manner which is compatible with other materials of the work and where Contractor certifies that proposed substitution is compatible.
4. Where specified product, material or method cannot be properly coordinated with other materials of the work and where Contractor certifies that proposed substitution can be properly coordinated.
5. Where specified product, material or method cannot be warranted as required and where Contractor certifies that proposed substitution can be so warranted.
6. Where specified product, material or method cannot be used without adversely affecting Owner's insurance coverage on completed work and where Contractor certifies that proposed substitution can be so used.
7. Where specified product, material or method will encounter other substantial non-compliance, which are not possible to otherwise overcome except by using proposed substitution.
8. Where specified product, material or method cannot receive required approval by governing authority and proposed substitution can be so approved.
9. Where substantial advantage is offered to the Owner; in terms of cost, time, energy conservation or other valuable considerations; after deducting offsetting responsibilities that Owner may be required to bear, including additional compensation to Architect for redesign and evaluation services, increased cost of other work by Owner or separate contractors, and similar considerations.

D. The burden is upon the Contractor, supplier and manufacturer to satisfy Architect that:

1. Proposed substitute is equal to, or superior to, the item specified.
2. Intent of the Contract Documents, including required performance, capacity, efficiency, quality, durability, safety, function, appearance, space clearances and delivery date, will be equaled or bettered.

E. Submission of shop drawings of unspecified manufacturer or shop drawings at variance with the Contract Documents is not a proper request for substitution.

F. Changes in work of other trades, such as structural supports, which are required as a result of substitution and the associated costs for such changes, shall be the complete responsibility of Contractor proposing substitution. Except as noted in subparagraph 1.10.C.9 above, there shall be no additional expense to the Owner.

1.11 SUBMITTALS

A. Prepare and submit shop drawings in accordance with the requirements hereinbefore specified, and with Division 1 Section "Submittal Procedures" in the manner described therein, modified as noted hereinafter.

B. The selection and intention to use a product specified by name shall not excuse the need for timely submission of shop drawings for that product.

C. Prior to submitting shop drawings, submit for review preliminary list of intended or proposed manufacturers for all items for which shop drawings are required.

D. Submission of shop drawings of an unnamed manufacture or shop drawings at variance with the Contract Documents is not a proper request for substitution.

E. Samples that are submitted in lieu of shop drawings shall be clearly identified and shall be submitted in duplicate. Only one sample will be returned and that accepted sample shall be kept available at appropriate job site office. Accepted sample retained by Architect will be kept available at Architect's home office.

F. Upon completion of shop drawing review, shop drawings will be returned, marked with one of following notations: No Exception Taken, Revise as Noted, Revise and Resubmit, or Rejected. Only products whose shop drawings are marked "No Exception Taken" or "Revise as Noted" shall be used on the project.

G. Submittals shall include the following information:

1. Descriptive and product data necessary to verify compliance with Contract Documents.
2. Manufacturer's specifications including materials of construction, metal gauge, thickness and finish.
3. Certified dimensional drawings including clearances required for maintenance or access.
4. Performance data, ratings, operating characteristics, and operating limits.
5. Electrical ratings and characteristics.
6. Wiring and control diagrams, where applicable.
7. Certifications requested, including UL label or listing.
8. List of accessories, which are required but are not being provided by the product manufacturer or are not being furnished under this Section. Identify the Section(s) under which the accessories are being furnished.

H. In addition, submittals shall be clearly marked for the following:

1. Specification Section and Paragraph, or Drawing Schedule/Note/Detail/etc., where equipment is specified.
2. Equipment or fixture identification corresponding to that used in Contract Documents.
3. Accessories and special or non-standard features and materials which are being furnished.

1.12 PRODUCT SELECTION

A. Contractor's options for selecting products are limited by Contract Document requirements and governing regulations and are not controlled by industry traditions or procedures experienced by

Contractor on previous construction projects. Required procedures include, but are not necessarily limited to, following various methods of specifying:

1. Single Product Manufacturer Named: Provide product indicated. Advise Architect, and obtain instructions before proceeding, when named product is known to be unacceptable or not feasible.
2. Two or More Manufacturers' Products Named: Provide one of the named products, at Contractor's option, but excluding products which do not comply with requirements. Do not provide, nor offer to provide, an unnamed product unless named products do not comply with requirements or are not feasible.
3. "Acceptable Equivalent" or "Or Equal": Where named products are accompanied by this term or words of similar effect, provide named products or propose substitute product according to paragraph 1.10 SUBSTITUTIONS.
4. Standards, Codes and Regulations: Where specification requires only compliance with a standard, code or regulation, Contractor may select any product which complies with requirements of that standard, code or regulation.
5. Performance Requirements: Provide products which comply with specific performances indicated and which are recommended by manufacturer (in published product literature or by individual certification) for application intended. Overall performance of product is implied where product is specified with only certain specific performance requirements.
6. Prescriptive Requirements: Provide products which have been produced in accordance with prescriptive requirements using specified materials and components, and complying with specified requirements for fabricating, finishing, testing and other manufacturing processes.
7. Visual Matching: Where matching with an established material is required, Architect's judgment of whether proposed product matches established material shall be final. Where product specified does NOT match established material, propose substitute product according to paragraph 1.10 SUBSTITUTIONS. Follow requirements for CHANGE ORDERS, also, if matching product within cost category of specified product is not available.
8. "Color as Selected by Architect": Unless otherwise noted, where specified product requirements include "Color as Selected by Architect" or words of similar effect, the selection of manufacturer and basic product complying with Contract Documents is Contractor's option and subsequent selection of color is Architect's option.

B. Inclusion by name, of more than one manufacturer or fabricator, does not necessarily imply acceptability of standard products of those named. All manufacturers, named or proposed, shall conform, with modification as necessary, to criteria established by contract documents for performance, efficiency, materials and special accessories.

1.13 COORDINATION DRAWINGS

A. Before materials are purchased, fabricated or work is begun, each Subcontractor shall prepare and obtain approval of coordination drawings, and sections for all floors/areas, including buried system/services, resulting in one (1) set of all-Trade-composite at 3/8" scale drawings, showing the size and location of all equipment, in the manner described herein under General Requirements. Architects review and approval of coordination drawings must be obtained prior to any fabrication or installation of any equipment or systems.

B. The coordination drawings shall be generated from a computer CAD program compatible with AutoCAD Release 2013, in DWG or DXF format. The Plumbing Subcontractor shall take the lead, supervise, and coordinate production of coordinated layout drawings, to show and coordinate all equipment. These drawings shall then be circulated to the Plumbing Subcontractor so that he can indicate all his work as

directed by the General Contractor and Architect and as required, to result in a fully coordinated installation.

C. All costs associated with all aspects of coordination drawings, regardless as to how long they take to produce and how many times they have to be redrawn, shall be borne by the Plumbing Subcontractor.

D. The Plumbing Subcontractor may purchase the Plumbing AutoCAD computer drawing files from the Plumbing Contract set on disk or via modem from the Engineer at the nominal cost of $500.00, if he so chooses.

1.14 COORDINATION OF WORK WITH OTHER TRADES

A. The Plumbing Subcontractor shall compare his drawings and specifications with those of other Trades as well as the Architectural drawings and specifications, and report any discrepancies between them to the Architect and obtain from the Architect written instructions for changes necessary in the Plumbing work.

B. Coordinate work with that of all other Trades affecting or affected by the work of this Section. Cooperate with such Trades to assure the steady progress of all work under the Contract.

C. All work shall be installed in cooperation with other Trades installing interrelated work. Before installation, Plumbing Subcontractor shall make proper provisions to avoid interferences in a manner approved by the Architect. All changes required in the work of the Plumbing Subcontractor or that of any other trade caused by the Plumbing Subcontractor's neglect, shall be made by him at his own expense, to the Architect's satisfaction.

D. The Plumbing Subcontractor must include in his bid sufficient dollar amounts to coordinate the work of this Contract. This project is complex and will require additional time to coordinate all Trades and allow implementation of the Owners Standards and maintenance serviceability requirements. This requirement shall include, but not be limited to, producing the coordination drawings, as many times and as many drawings as required, to ensure serviceability of equipment, as approved by the Architect.

E. Locations of ductwork and piping distribution, equipment, systems, etc. shall be adjusted to accommodate the work with interferences anticipated and encountered. The Plumbing Subcontractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination drawings shall be completed to verify dimensions and characteristics of the various systems installations.

F. Lines which pitch shall have the right-of-way over those which do not pitch. For example, steam piping shall normally have the right-of-way. Lines whose elevations cannot be changed shall have the right-of-way over lines whose elevations can be changed.

G. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Plumbing Subcontractor shall provide elbows, fittings, offsets in ductwork and piping, etc. as required for his work to affect these offsets, transitions and changes in direction.

H. All work shall be installed in a way to permit removal (without damage to other parts) all other system components provided under this Contract requiring periodic replacement or maintenance. All work shall be done to allow easy access for maintaining equipment. The Owner and Engineer will require proof via the preparation of large scale sections and part plans that pull and junction boxes, etc. are accessible after the work is completed. Any items in the field discovered to be in non-compliance shall be removed and relocated, as required, and as directed by the Architect.

I. Any equipment shown on the Plumbing and/or Architectural drawings to be provided with services shall be included under this Contract as applicable to make equipment complete and operable. Additional equipment, etc., shall be provided to accomplish the above requirement, as required, all as part of this Contract, at no extra cost to the Owner. This requirement necessitates that the Plumbing Subcontractor review the Architectural drawings and the drawings of other Trades during bidding to ascertain the extent of all requirements, and interface between the Trades and scope of work.

J. The Plumbing Subcontractor shall coordinate his work with other Trades' work so that all equipment and systems can be easily, safety and properly serviced and maintained. It is imperative that service personnel can safely access all equipment. Provide safety rails, steps, ladders, valve chains, handle extensions, etc. as required, in addition to the ones shown on the drawings, to ensure safe and easy access to all equipment is provided in a manner approved by the Architect.

1.15 WARRANTEE

A. Attention is directed to provisions of the General Requirements and Supplementary General Requirements regarding and warranties for work under this Contract.

B. All warranties shall begin on the Date of Substantial Completion of the entire project or the Owner’s acceptance of the workmanship and/or material covered by the warranty, whichever is later. The warranty coverage shall continue for the specified period. Refer to individual specification sections for warranty period. If no specific warranty period is specified, the warranty shall extend for a minimum of 365 days.

C. Manufacturers shall provide their standard warranties for work under the Plumbing Trades. However, such warranties shall be in addition to, and not in lieu of, all other liabilities which the manufacturer and Plumbing Subcontractor may have by law or by other provisions of the Contract Documents.

D. All materials, items of equipment and workmanship furnished under the Plumbing Section shall carry the standard warranty against all defects in material and workmanship. Any fault due to defective or improper material, equipment, workmanship or design which may develop shall be made good, forthwith, by and at the expense of the Plumbing Subcontractor for the work under his Contract, including all other damage done to areas, materials and other systems resulting from this failure.

E. The Plumbing Subcontractor shall warranty that all elements of the systems which are to be provided under his Contract, are of sufficient capacity to meet the specified performance requirements as set forth herein or as indicated.

F. Upon receipt of notice from the Owner or Architect of failure of any part of the systems or equipment during the warranty period, the affected part or parts shall be replaced by the Plumbing Subcontractor for his work or any other work affected by the failure(s).

G. Plumbing Subcontractor shall furnish, before the final payment is made, a written warranty covering the above requirements in accordance with the General Requirements.

1.16 THE SUBCONTRACTOR

A. The Plumbing Subcontractor shall visit the site of the proposed new facility and base his bids from his own site examinations and estimates. The Plumbing Subcontractor shall not hold the Architect, Engineer, Owner or their agents or employees responsible for, or bound by, any schedule, estimate or of any plan thereof. The Plumbing Subcontractor shall study the Contract Documents included under this Contract to determine exactly the extent of work provided under this Contract, as well as to ascertain the difficulty to be encountered in performing the work, in installing new equipment and systems and coordinating the work with the other Trades and existing building conditions.

B. The Plumbing Subcontractor shall faithfully execute his work according to the terms and conditions of the Contract and specifications, and shall take all responsibility for and bear all losses resulting to him in the execution of his work.

C. The Plumbing Subcontractor shall be responsible for the location and performance of work provided under his Contract as indicated on the Contract Documents. All parties employed directly or indirectly by the Plumbing Subcontractor shall perform their work according to all the conditions as set forth in these specifications.

D. The Plumbing Subcontractor shall furnish all materials and do all work in accordance with these specifications, and any supplementary documents provided by the Architect. The work shall include everything shown on the drawings and/or required by the specifications as interpreted by the Architect, regardless of where such information is indicated in the Contract Documents (Architectural, Electrical, Fire Protection, HVAC, etc.). Unless specifically indicated otherwise, all work and materials furnished and installed shall be new, unused and of the best quality and workmanship. The Plumbing Subcontractor shall cooperate with the Architect so that no error or discrepancy in the Contract Documents shall cause defective materials to be used or poor workmanship to be performed.

1.17 COORDINATION OF WORK

A. The Plumbing Subcontractor shall compare his drawings and specifications with those of other Trades as well as the Architectural drawings and specifications, and report any discrepancies between them to the Architect and obtain from the Architect written instructions for changes necessary in the Plumbing work.

B. Coordinate work with that of all other Trades affecting or affected by the work of this Section. Cooperate with such Trades to assure the steady progress of all work under the Contract.

C. All work shall be installed in cooperation with other Trades installing interrelated work. Before installation, Plumbing Subcontractor shall make proper provisions to avoid interferences in a manner

approved by the Architect. All changes required in the work of the Plumbing Subcontractor or that of any other trade caused by the Plumbing Subcontractor's neglect, shall be made by him at his own expense, to the Architect's satisfaction.

D. The Plumbing Subcontractor must include in his bid sufficient dollar amounts to coordinate the work of this Contract. This project is complex and will require additional time to coordinate all Trades and allow implementation of the Owners Standards and maintenance serviceability requirements. This requirement shall include, but not be limited to, producing the coordination drawings, as many times and as many drawings as required, to ensure serviceability of equipment, as approved by the Architect.

E. Locations of ductwork and piping distribution, equipment, systems, etc. shall be adjusted to accommodate the work with interferences anticipated and encountered. The Plumbing Subcontractor shall determine the exact routing and location of his systems prior to fabrication or installation of any system component. Accurate measurements and coordination drawings shall be completed to verify dimensions and characteristics of the various systems installations.

F. Lines which pitch shall have the right-of-way over those which do not pitch. For example, steam piping shall normally have the right-of-way. Lines whose elevations cannot be changed shall have the right-of-way over lines whose elevations can be changed.

G. Offsets, transitions and changes of direction in all systems shall be made as required to maintain proper headroom and pitch of sloping lines whether or not indicated on the drawings. The Plumbing Subcontractor shall provide elbows, fittings, offsets in ductwork and piping, etc. as required for his work to affect these offsets, transitions and changes in direction.

H. All work shall be installed in a way to permit removal (without damage to other parts) all other system components provided under this Contract requiring periodic replacement or maintenance. All work shall be done to allow easy access for maintaining equipment. The Owner and Engineer will require proof via the preparation of large scale sections and part plans that pull and junction boxes, etc. are accessible after the work is completed. Any items in the field discovered to be in non-compliance shall be removed and relocated, as required, and as directed by the Architect.

I. The Contract Drawings are diagrammatic only intending to show general runs and locations of the ductwork, piping, equipment, systems equipment, etc. and not necessarily showing all required offsets, details and accessories and equipment to be connected. All work shall be accurately laid out with other Trades to avoid conflicts and to obtain a neat and workmanlike installation which will afford maximum accessibility for operation, maintenance and headroom.

J. Where discrepancies in scope of work as to what Trade provides items, such conflicts shall be reported to the Architect during bidding and prior to signing of the Contract. If such action is not taken, the Plumbing Subcontractor shall furnish such items as part of his work as necessary, for complete and operable systems and equipment, as determined by the Architect.

K. The Plumbing Subcontractor shall coordinate the installation of all equipment.

L. Where drawing details, plans, specification requirements and/or scheduled equipment capacities are in conflict or equipment are shown to be different between plans and/or between plans and riser diagrams, details or specifications, the most stringent requirement will be included in the Contract. Plumbing systems and equipment called for in the specification and/or shown on the drawings shall be provided under this Contract as if it were required by both the drawings and specifications. However, prior to ordering or installation of any portion of work which appears to be in conflict, such work shall be brought to Architect's attention for direction as to what is to be provided.

M. Any equipment shown on the Plumbing and/or Architectural drawings to be provided with services shall be included under this Contract as applicable to make equipment complete and operable. Additional equipment, etc., shall be provided to accomplish the above requirement, as required, all as part of this Contract, at no extra cost to the Owner. This requirement necessitates that the Plumbing Subcontractor review the Architectural drawings and the drawings of other Trades during bidding to ascertain the extent of all requirements, and interface between the Trades and scope of work.

N. The Plumbing Subcontractor shall coordinate his work with other Trades' work so that all equipment and systems can be easily, safety and properly serviced and maintained. It is imperative that service personnel can safely access all equipment. Provide safety rails, steps, ladders, valve chains, handle extensions, etc. as required, in addition to the ones shown on the drawings, to ensure safe and easy access to all equipment is provided in a manner approved by the Architect.

1.18 GIVING INFORMATION

A. Plumbing Subcontractor shall keep himself fully informed as to the shape, size and position of all openings required for his apparatus and shall give information to the General Contractor and other Subcontractors sufficiently in advance of the work so that all openings may be built in advance.

1.19 EQUIPMENT AND MATERIALS

A. Equipment and materials shall be delivered to the site and stored in original sealed containers, suitably sheltered from the elements, but readily accessible for inspection by the Architect until installed. All items subject to moisture damage such as controls shall be stored in dry, heated spaces.

B. Equipment shall be tightly covered and protected against dirt, water, and chemical or mechanical injury and theft. At the completion of the work, equipment and materials shall be cleaned and polished thoroughly and turned over to the Owner in a condition satisfactory to the Architect. Damage or defects that develop before acceptance of the work shall be made good at the Plumbing Subcontractor's expense.

C. The Plumbing Subcontractor shall make necessary field measurements to ascertain space requirements, for equipment and connections to be provided under his respective Trade and shall furnish and install such sizes and shapes of equipment to allow for the final installation to conform to the drawings and specifications.

D. Manufacturer's directions shall be followed completely in the delivery, storage, protection and installation. Promptly notify the Architect in writing of any conflict between any requirements of the Contract Documents and the manufacturer's directions. Obtain the Architect's written instructions before proceeding with the work. Should Plumbing Subcontractor perform any work that does not comply with

the manufacturer's directions or written instructions from the Architect, he shall bear all costs arising in correcting any deficiencies that should arise.

E. All equipment of one type shall be the products of one manufacturer.

F. Equipment prepurchased by the General Contractor on behalf of the Owner or by the Owner himself, if assigned to the Plumbing Subcontractor, shall be received, installed, tested, etc., as if the equipment was purchased by the Plumbing Subcontractor. All guarantees, service contracts, etc., shall be the same as for all other equipment provided under this Contract.

1.20 USE OF PREMISES

A. The Plumbing Subcontractor shall confine all apparatus, storage of materials and construction to the limits as directed by the Architect and he shall not encumber the premises with his materials. The Plumbing Subcontractor shall be held responsible for repairs, patching, or cleaning arising from any unauthorized use of premises.

B. Notwithstanding any approvals or instructions which must be obtained by the Plumbing Subcontractor from the Architect in connection with the use of the premises, the responsibility for the safe working conditions at the site shall remain that of the Plumbing Subcontractor. The Architect, Engineer or Owner shall not be deemed to have any responsibility or liability in connection with safe working conditions at the site.

1.21 PROTECTION

A. Materials, equipment, etc., shall be properly protected during construction and all conduit openings shall be temporarily closed so as to prevent obstruction and damage. Post notice prohibiting the use of all systems provided under the Plumbing Contract, prior to completion of work and acceptance of all systems by the Owner except as otherwise, instructed by Architect. Take precautions to protect all materials furnished from damage and theft.

B. The Plumbing Subcontractor shall furnish, place and maintain proper safety guards for the prevention of accidents that might be caused by the workmanship, materials, equipment or Plumbing systems provided under his Contract.

1.22 DAMAGE TO OTHER WORK

A. The Plumbing Subcontractor shall be held responsible and shall pay for all damages caused by his work to the building structures, equipment, systems, etc., and all work and finishes installed under this Contract. Repair of such damage shall be done by the General Contractor at the expense of the Plumbing Subcontractor, to the Architect's satisfaction.

1.23 CORRECTION OF WORK

A. The Plumbing Subcontractor shall promptly correct all work provided under his Contract and rejected by the Architect as defective or as failing to conform to the Contract Documents, whether observed before or after completion of work, and whether or not fabricated, installed or completed.

1.24 EXTRA WORK

A. No claim for extra work will be allowed unless it is authorized by the Architect before commencement of the extra said work.

1.25 TOUCH-UP PAINTING

A. All equipment and systems shall be thoroughly cleaned of rust, splatters and other foreign matter of discoloration leaving every part of all systems in an acceptable prime condition. The Plumbing Subcontractor for the work under his Contract shall refinish and restore to the original condition all equipment which has sustained damage to the manufacturer's prime and finish coats of paint and/or enamel during the course of construction, regardless of the source of damage. double check valve

1.26 PARTS LIST AND INSTRUCTIONS FOR OPERATION AND MAINTENANCE

A. The Plumbing Subcontractor shall thoroughly instruct the Owner, to the complete satisfaction of the Architect, in the proper operation of all systems and equipment provided by him. The Plumbing Subcontractor shall make arrangements, via the Architect, as to whom the instructions are to be given in the operation of the basic and auxiliary systems and the period of time in which they are to be given. The Architect shall be completely satisfied that the Owner has been thoroughly and completely instructed in the proper operation of all systems and equipment before final payment is made. If the Architect determines that complete and thorough instructions have not been given by the Plumbing Subcontractor to the Owner's representative, then the Plumbing Subcontractor shall be directed by the Architect to provide whatever instructions are necessary until the intent of this specification has been complied with.

B. Plumbing Subcontractor shall submit to the Architect for approval, the required typed sets (see General Conditions and Division 1) bound neatly in loose-leaf binders, of all instructions for the installation, operation, emergency operation, start-up, care and maintenance of all equipment and systems (including instructions for the ordering and stocking of spare parts for all equipment installed under this Contract). The lists shall include part numbers and suggested supplier. Each set shall also include an itemized list of component parts that should be kept on hand and where such parts can be purchased.

C. Information shall indicate possible problems with equipment and suggested corrective action. The manuals shall be indexed for each type of equipment. Each section shall be clearly divided from the other sections. A sub-index for each section shall also be provided. The methodology of setting-up the manuals shall be submitted to the Architect and Owner for review prior to final submission of manuals.

1.27 MANUFACTURER'S REPRESENTATIVE

A. The Plumbing Subcontractor shall provide, at the appropriate time or as directed by Architect, the on-site services of a competent factory trained Engineer of the manufacturer of specific equipment, to inspect, test, adjust and place in proper operating condition any and all items of the same manufacturer. No additional compensation will be allowed for such services. A written report shall be issued by the particular manufacturer with his findings for the Architect's record.

1.28 RECORD DRAWINGS/AS-BUILT DRAWINGS

A. The Plumbing Subcontractor shall maintain current at the site a set of his drawings on which he shall accurately show the actual installation of all work provided under his Contract indicating hereon any variation from the Contract Drawings, in accordance with the General Conditions and Division 1. Changes, whether resulting from formal change orders or other instructions issued by the Architect, shall be recorded. Include changes in sizes, location, and dimensions of equipment, etc.

B. The Plumbing Subcontractor shall indicate progress by coloring-in equipment and associated appurtenances exactly as they are erected. This process shall incorporate both the changes noted above and all other deviations from the original drawings whether resulting from job conditions encountered or from any other causes.

C. The marked-up and colored-up prints will be used as a guide for determining the progress of the work installed. They shall be inspected periodically by the Architect and Owner and they shall be corrected immediately if found either inaccurate or incomplete. This procedure is mandatory.

D. At the completion of the job, these prints shall be submitted to the General Contractor and then to the Architect for final review and comment. The prints will be returned with appropriate comments and recommendations. These corrected prints, together with corrected prints indicating all the revisions, additions and deletions of work, shall form the basis for preparing a set of As-built Record Drawings.

E. The Subcontractor shall be responsible for generating as-built Record Drawings utilizing CAD based documents in AutoCAD Release 2000 DWG or DXF format. A bound set of plans, as well as the computer files, on disk, shall be turned over to the Architect for review. After acceptance of the as-built documents by the Architect, the Plumbing Subcontractor shall make any corrections necessary to the as-built documents and prepare one reproducible set of drawings as well as bound blueprint set(s) (quantity as determined by the Architect) for distribution to the Owner via the Architect.

F. The Plumbing Subcontractor may use the computer drawing files used for coordination drawings or purchase the Engineers most recently updated computer drawing files at a nominal charge of $500.00 per drawing file. The updated drawings may not include all changes made during the course of construction and it shall be the Plumbing Subcontractors responsibility to update the as-built documents to include all changes brought forth to the project resulting from bulletins, request for information (RFI's), change orders, etc. The Plumbing Subcontractor may review the Engineers latest computer files for completeness prior to purchase, however the Engineer will not be responsible for updating the computer files.

G. Included with the above shall be a complete drawing list and a standard layering system, which shall be required to be maintained within the as-built Record CAD documents.

H. The Plumbing Subcontractor shall be issued bulletins in the same manner as the original Design Documents described above.

I. The as-built CAD documents required shall be in addition to other requirements stated elsewhere.

1.29 SAMPLES

A. Submit samples as requested by Architect.

1.30 GENERAL PRODUCT REQUIREMENTS

A. Products shall be undamaged and unused at time of installation and shall be complete with accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use.

B. Where available, products shall be standard products of types which have been produced and use previously and successfully on other projects and in similar applications.

C. Where products by their nature and their use are likely to need replacement parts on future date, for maintenance and repair or replacement work, products shall be standard domestically produced products likely to have such parts available to Owner in future.

D. Labels and stamps which are required for observation after installation shall be located on accessible surfaces which, in occupied spaces, are not conspicuous. Other labels and stamps shall be located on concealed surfaces.

1.31 COOPERATION AND WORK PROGRESS

A. The Plumbing work shall be carried on under the usual construction conditions, in conjunction with all other work at the site. The Plumbing Subcontractor shall cooperate with the Architect, General Contractor, all other Subcontractors and equipment suppliers working at the site. The Plumbing Subcontractor shall coordinate the work and proceed in a manner so as not to delay the progress of the project.

B. The Plumbing Subcontractor shall coordinate his work with the progress of the building and other Trades so that he will complete his work as soon as conditions permit and such that interruptions of the building functions will be at a minimum. Any overtime hours worked or additional costs incurred due to lack of or improper coordination with other Trades or the Owner by the Plumbing Subcontractor, shall be assumed by him without any additional cost to the Owner.

C. The Plumbing Subcontractor shall furnish information on all equipment that is furnished under this Section but installed under another Section to the installing Subcontractor as specified herein.

D. The Plumbing Subcontractor shall provide all materials, equipment and workmanship to provide for adequate protection of all Plumbing equipment during the course of construction of the project. This shall also include protection from moisture and all foreign matter. The Plumbing Subcontractor shall also be responsible for damage which he causes to the work of other Trades, and he shall remedy such injury at his own expense.

E. Waste materials shall be removed promptly from the premises. All material and equipment stored on the premises shall be kept in a neat and orderly fashion. Material or equipment shall not be stored where exposed to the weather. The Plumbing Subcontractor shall be responsible for the security, safekeeping and damages, including acts of vandalism, of all material and equipment stored at the job site.

F. The Plumbing Subcontractor shall be responsible for unloading all Plumbing equipment and materials delivered to the site. This shall also include all large and heavy items or equipment which require hoisting. Consult with the General Contractor for hoisting/crane requirements. During construction of the building, the Plumbing Subcontractor shall provide additional protection against moisture, dust accumulation and physical damage of the main service and distribution equipment. This shall include furnishing and installing temporary heaters within these units, as approved, to evaporate excessive moisture and ventilate it from the room, as may be required.

G. It shall be the responsibility of the Plumbing Subcontractor to coordinate the delivery of the Plumbing equipment to the project prior to the time installation of equipment will be required; but he shall also make sure such equipment is not delivered too far in advance of such required installation, to ensure that possible damage and deterioration of such equipment will not occur. Such equipment stored for an excessively long period of time (as determined in the opinion of the Architect) on the project site prior to installation may be subject to rejection by the Architect.

H. The Plumbing Subcontractor shall erect and maintain, at all times, necessary safeguards for the protection of life and property of the Owner, Workmen, Staff and the Public.

I. Prior to installation, the Plumbing Subcontractor has the responsibility to coordinate the exact mounting arrangement and location of Plumbing equipment to allow proper space requirements as indicated in the NEC. Particular attention shall be given in the field to group installations. If it is questionable that sufficient space, conflict with the work of other Subcontractors, architectural or structural obstructions will result in an arrangement which will prevent proper access, operation or maintenance of the indicated equipment, the Plumbing Subcontractor shall immediately notify the Contractor and not proceed with this part of the Contract work until definite instructions have been given to him by the Architect.

J. The Plumbing Subcontractor shall obtain from the Plumbing and Electrical Subcontractors copies of all shop drawing prints showing the ductwork and piping installation as they will be put in place on the project. These drawings shall be thoroughly checked by the Plumbing Subcontractor be coordinated with the work of other trades so as to prevent any installation conflict.

1.32 INSTALLATION

A. General:

1. Unless specifically noted or indicated otherwise, all equipment and material specified in Division 22 of this specification or indicated on the drawings shall be installed under this Contract whether or not specifically itemized herein. This Section covers particular installation methods and requirements peculiar to certain items and classes or material and equipment.
2. The Plumbing Subcontractor shall obtain detailed information from manufacturers of equipment as to proper methods of installation.

3. The Plumbing Subcontractor shall obtain final roughing dimensions and other information as needed for complete installation of items furnished under other Sections or furnished by the Owner.
4. The Plumbing Subcontractor shall keep fully informed of size, shape and position of openings required for material and equipment provided under this and other Sections. Ensure that openings required for work of this Section are coordinated with work of other Sections. Provide cutting coring and patching as necessary.
5. All miscellaneous hardware and support accessories, including support rods, nuts, bolts, screws and other such items, shall be of a galvanized or cadmium plated finish or of another approved rust-inhibiting coating.
6. Throughout this Section where reference is made to steel channel supports, it shall be understood to mean that the minimum size shall be 1 5/8" mild strip steel with minimum wall thickness of 0.105", similar to Unistrut P1000 or equal products manufactured by Kindorf or Husky Products Co.

1.33 MATERIALS AND WORKMANSHIP

A. All materials and equipment shall be new and unused and shall meet requirements of the latest Standards of NEMA, UL, IPCEA, ANSI and IEEE. Equipment shall have components required or recommended by OSHA, applicable NFPA documents and shall be UL listed and labeled.

B. Despite references in the specifications or on the drawings to materials or pieces of equipment by name, make or catalog number, such references shall be interpreted as establishing standards of quality for materials and performance.

C. Finish of materials, components and equipment shall not be less than Industry good practice. When material or equipment is visible or subject to corrosive or atmospheric conditions, the finish shall be as approved by the Architect.

D. Provide proper access to material or equipment that requires inspection, replacement, repair or service. If proper access cannot be provided, confer with the Architect as to the best method of approach to minimize effects of reduced access.

E. All work shall be installed in a neat and workmanlike manner and shall be done in accordance with all Local and State Codes.

F. The Owner will not be responsible for material, equipment or the installation of same before testing and acceptance.

1.34 CLEANING

A. This Section of the specifications shall include the cleaning of all equipment on a day-to-day basis and final cleaning of all Plumbing equipment prior to turning building over to the Owner. All necessary cleaning referred to herein shall be cleaned to the satisfaction of the Architect.

1.35 FINAL INSPECTION

A. When all Plumbing work on the project has been completed and is ready for final inspection, such an inspection shall be made. At this time, and in addition to all other requirements in the Contract Documents, the Plumbing Subcontractor, for the work under this Contract, shall demonstrate that the requirements of these specifications have been met to the Architect's satisfaction.

END OF SECTION 220100

SECTION 220516 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220517	Sleeves and Sleeve Seals for Plumbing Piping
3.	Section 220518	Escutcheons for Plumbing Piping
4.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
5.	Section 220548	Vibration and Seismic Controls for Plumbing Piping and Equipment
6.	Section 220553	Identification for Plumbing Piping and Equipment
7.	Section 220719	Plumbing Piping Insulation
8.	Section 221113	Facility Water Distribution Piping
9.	Section 221116	Domestic Water Piping
10.	Section 221119	Domestic Water Piping Specialties
11.	Section 221125	Natural Gas Piping

1.2 SUMMARY

A. Section Includes:

1. Rubber union connector packless expansion joints.
2. Flexible-hose packless expansion joints.
3. Metal-bellows packless expansion joints.
4. Externally pressurized metal-bellows packless expansion joints.
5. Rubber packless expansion joints.
6. Grooved-joint expansion joints.
7. Alignment guides and anchors.
8. Pipe loops and swing connections.

1.3 PERFORMANCE REQUIREMENTS

A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.

B. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

1.4 SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal: For each anchor and alignment guide, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
3. Alignment Guide Details: Detail field assembly and attachment to building structure.
4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

C. Welding certificates.

D. Maintenance Data: For expansion joints to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Provide products by one of the following.
1. Adsco Manufacturing LLC.
2. Advanced Thermal Systems, Inc.
3. American BOA, Inc.
4. Anvil International, Inc.
5. Badger Industries, Inc.
6. Expansion Joint Systems, Inc.
7. Flex-Hose Co., Inc.
8. Flexicraft Industries.
9. Flex-Weld, Inc.
10. Hyspan Precision Products, Inc.
11. Mason Industries, Inc.; Mercer Rubber Co.
12. Metraflex, Inc.
13. Senior Flexonics Pathway.
14. Shurjoint Piping Products.
15. Tozen Corporation.
16. Unaflex.
17. Unisource Manufacturing, Inc.
18. U.S. Bellows, Inc.
19. Victaulic Company.

2.2 PACKLESS EXPANSION JOINTS

A. Rubber Union Connector Expansion Joints:

1. Material: Twin reinforced-rubber spheres with external restraining cables.
2. Minimum Pressure Rating: 150 psig at 170 deg F, unless otherwise indicated.
3. End Connections for 2-inch and Smaller: Threaded.

B. Flexible-Hose Packless Expansion Joints:

1. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
2. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.
3. Expansion Joints for Copper Tubing 2-inch and Smaller: Copper-alloy fittings with solder-joint end connections.

    a. Bronze hoses and single-braid bronze sheaths with 450 psig at 70 deg F ratings.
    b. Bronze hoses and double-braid bronze sheaths with 700 psig at 70 deg F ratings.

4. Expansion Joints for Copper Tubing 2-1/2-inch to 4-inch: Copper-alloy fittings with threaded end connections.

    a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 300 psig at 70 deg F ratings.
    b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 420 psig at 70 deg F ratings.

5. Expansion Joints for Steel Piping 2-inch and Smaller: Carbon-steel fittings with threaded end connections.

    a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 450 psig at 70 deg F ratings.
    b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 700 psig at 70 deg F ratings.

6. Expansion Joints for Steel Piping 2-1/2-inch to 6-inch: Carbon-steel fittings with welded end connections.

    a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 200 psig at 70 deg F ratings.
    b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 275 psig at 70 deg F ratings.

7. Expansion Joints for Steel Piping 8-inch to 12-inch: Carbon-steel fittings with flanged end connections.

    a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 125 psig at 70 deg F ratings.
    b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F ratings.

8. Expansion Joints for Steel Piping 14-inch and Larger: Carbon-steel fittings with flanged end connections.

    a. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F ratings.

C. Metal-Bellows Packless Expansion Joints:

1. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
2. Type: Circular, corrugated bellows with external tie rods.
3. Minimum Pressure Rating: 175 psig, unless otherwise indicated.
4. Configuration: Single joint with base and double joint with base class(es), unless otherwise indicated.
5. Expansion Joints for Copper Tubing: Single or multi-ply phosphor-bronze bellows, copper pipe ends, and brass shrouds.

    a. End Connections for Copper Tubing 2-inch and Smaller: Solder joint.
    b. End Connections for Copper Tubing 2-1/2-inch to 4-inch or threaded.
    c. End Connections for Copper Tubing 5-inch and Larger: Flanged.

6. Expansion Joints for Steel Piping: Single or multi-ply stainless-steel bellows, steel pipe ends, and carbon-steel shroud.

    a. End Connections for Steel Pipe 2-inch and Smaller: Threaded.
    b. End Connections for Steel Pipe 2-1/2-inch and Larger: Welded.

D. Externally Pressurized Metal-Bellows Packless Expansion Joints:

1. Minimum Pressure Rating: 200 psig, unless otherwise indicated.
2. Description:

    a. Totally enclosed, externally pressurized, multi-ply, stainless-steel bellows isolated from fluid flow by an internal pipe sleeve.
    b. Carbon-steel housing.
    c. Drain plugs and lifting lug for 3-inch and larger.
    d. Bellows shall have operating clearance between the internal pipe sleeves and the external shrouds.
    e. Joint Axial Movement: 4 inches of compression and 1 inch of extension.

3. Permanent Locking Bolts: Set locking bolts to maintain joint lengths during installation. Temporary welding tabs that are removed after installation in lieu of locking bolts are not acceptable.
4. End Connection Configuration: Flanged; one raised, fixed and one floating flange.

E. Rubber Packless Expansion Joints:

1. Standards: ASTM F 1123 and FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
2. Material: Fabric-reinforced rubber complying with FSA-PSJ-703.
3. Arch Type: Single or multiple arches with external control rods.

4. Spherical Type: Single or multiple spheres with external control rods.
5. Minimum Pressure Rating for 1-1/2-inch to 4-inch: 150 psig at 220 deg F.
6. Minimum Pressure Rating for 5-inch and 6-inch: 140 psig at 200 deg F.
7. Material for Fluids Containing Acids, Alkalis, or Chemicals: Chlorosulfonyl-polyethylene rubber.
8. Material for Fluids Containing Gas, Hydrocarbons, or Oil: Buna-N.
9. Material for Water: Ethylene-propylene-diene terpolymer rubber.
10. End Connections: Full-faced, integral steel flanges with steel retaining rings.

2.3 GROOVED-JOINT EXPANSION JOINTS

A. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.

B. Standard: AWWA C606, for grooved joints.

C. Nipples: ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.

D. Couplings: Seven, flexible type for steel-pipe dimensions. Include ferrous housing sections, Buna-N gasket suitable for diluted acid, alkaline fluids, ethylene-propylene-diene terpolymer rubber gasket suitable for cold and hot water, and bolts and nuts.

2.4 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides:

1. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding slider for bolting to pipe.

B. Anchor Materials:

1. Steel Shapes and Plates: ASTM A 36/A 36M.
2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
3. Washers: ASTM F 844, steel, plain, flat washers.
4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.

    a. Stud: Threaded, zinc-coated carbon steel.
    b. Expansion Plug: Zinc-coated steel.
    c. Washer and Nut: Zinc-coated steel.

5. Chemical Fasteners: Insert-type stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.

    a. Bonding Material: ASTM C 881/C 881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.

b. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud, unless otherwise indicated.
c. Washer and Nut: Zinc-coated steel.

PART 3 - EXECUTION

3.1 EXPANSION JOINT INSTALLATION

A. Install expansion joints of sizes matching sizes of piping in which they are installed.

B. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."

C. Install rubber packless expansion joints according to FSA-PSJ-703.

D. Install grooved-joint expansion joints to grooved-end steel piping.

3.2 PIPE LOOP AND SWING CONNECTION INSTALLATION

A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.

C. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.

D. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

3.3 ALIGNMENT-GUIDE AND ANCHOR INSTALLATION

A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

B. Install one guide on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

C. Attach guides to pipe, and secure guides to building structure.

D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

E. Anchor Attachments:

1. Anchor Attachment to Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

2. Anchor Attachment to Galvanized-Steel Pipe: Attach with pipe hangers. Use MSS SP-69, Type 42, riser clamp welded to anchor.
3. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24; U bolts bolted to anchor.

F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.

1. Anchor Attachment to Steel Structural Members: Attach by welding.
2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.

G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 22016

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220518	Escutcheons for Plumbing Piping
3.	Section 220719	Plumbing Piping Insulation
4.	Section 221113	Facility Water Distribution Piping
5.	Section 221116	Domestic Water Piping
6.	Section 221125	Natural Gas Piping
7.	Section 221313	Facility Sanitary Sewers
8.	Section 221316	Sanitary Waste and Vent Piping
9.	Section 221413	Storm Drainage Piping

C. Section Includes:

1. Sleeves.
2. Stack-sleeve fittings.
3. Sleeve-seal systems.
4. Sleeve-seal fittings.
5. Grout.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A53/A53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 STACK-SLEEVE FITTINGS

A. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

A. Install stack-sleeve fittings in new slabs as slabs are constructed.

1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

   a. Piping Smaller Than 6-inch: Galvanized-steel wall sleeves.
   b. Piping 6-inch and Larger: Galvanized-steel wall sleeves.

2. Exterior Concrete Walls below Grade:

   a. Piping Smaller Than 6-inch: Cast-iron wall sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

   b. Piping 6-inch and Larger: Cast-iron wall sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

   a. Piping Smaller Than 6-inch: Cast-iron wall sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

   b. Piping 6-inch and Larger: Cast-iron wall sleeves with sleeve-seal system.

      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

   a. Piping Smaller Than 6-inch: Galvanized-steel-pipe sleeves.
   b. Piping 6-inch and Larger: Galvanized-steel-pipe sleeves.

5. Interior Partitions:

   a. Piping Smaller Than 6-inch: Galvanized-steel-pipe sleeves.
   b. Piping 6-inch and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220517	Sleeves and Sleeve Seals for Plumbing Piping
3.	Section 220719	Plumbing Piping Insulation
4.	Section 221113	Facility Water Distribution Piping
5.	Section 221116	Domestic Water Piping
6.	Section 221125	Natural Gas Piping
7.	Section 221313	Facility Sanitary Sewers
8.	Section 221316	Sanitary Waste and Vent Piping
9.	Section 221413	Facility Storm Drainage Piping

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

D. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass finish.
i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
j. Bare Piping in Equipment Rooms: One-piece, cast-brass finish.
k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.

2. Escutcheons for Existing Piping:

a. Chrome-Plated Piping: Split-casting brass type with polished, chrome-plated finish.
b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge.
g. Bare Piping in Unfinished Service Spaces: Split-casting brass type with polished, chrome-plated finish.
h. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed hinge.
i. Bare Piping in Equipment Rooms: Split-casting brass type with polished, chrome-plated finish.
j. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with concealed hinge.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.
2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

SECTION 220519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220553	Identification for Plumbing Piping and Equipment
3.	Section 221113	Facility Water Distribution Piping
4.	Section 221116	Domestic Water Piping
5.	Section 221119	Domestic Water Piping Specialties

1.2 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Filled-system thermometers.
3. Liquid-in-glass thermometers.
4. Light-activated thermometers.
5. Thermowells.
6. Dial-type pressure gages.
7. Gage attachments.
8. Test plugs.
9. Test-plug kits.
10. Sight flow indicators.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Certificates: For each type of meter and gage, from manufacturer.

C. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Provide products by one of the following:

1. Ashcroft Inc.
2. Blue Ribbon Corp.
3. Marsh Bellofram.

4. Miljoco Corporation.
5. Palmer Wahl Instrumentation Group.
6. REOTEMP Instrument Corporation.
7. Tel-Tru Manufacturing Company.
8. Trerice, H. O. Co.
9. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
10. Weiss Instruments, Inc.
11. WIKA Instrument Corporation - USA.

2.2 BIMETALLIC-ACTUATED THERMOMETERS

A. Standard: ASME B40.200.

B. Case: Liquid-filled and sealed type(s); stainless steel with 3-inch nominal diameter.

C. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F.

D. Connector Type(s): Union joint, rigid, back and rigid, bottom, with unified-inch screw threads.

E. Connector Size: 1/2 inch, with ASME B1.1 screw threads.

F. Stem: 0.25 in diameter; stainless steel.

G. Window: Heavy glass.

H. Ring: Stainless steel.

I. Element: Bimetal coil.

J. Pointer: Dark-colored metal.

K. Accuracy: Plus or minus 1 percent of scale range.

2.3 FILLED-SYSTEM THERMOMETERS

A. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:
1. Standard: ASME B40.200.
2. Case: Sealed type, cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
3. Element: Bourdon tube or other type of pressure element.
4. Movement: Mechanical, dampening type, with link to pressure element and connection to pointer.
5. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
6. Pointer: Dark-colored metal.
7. Window: Heavy glass.
8. Ring: Stainless steel.
9. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device; with ASME B1.1 screw threads.
10. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.

    a. Design for Thermowell Installation: Bare stem.

11. Accuracy: Plus or minus 1 percent of scale range.

2.4 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:
1. Standard: ASME B40.200.
2. Case: Cast aluminum; 6-inch nominal size.
3. Case Form: Back angle or Straight unless otherwise indicated.
4. Tube: Glass with magnifying lens and blue organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
6. Window: Glass.
7. Stem: Aluminum or brass and of length to suit installation.

a. Design for Thermowell Installation: Bare stem.

8. Connector: 3/4 inch, with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

B. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
1. Standard: ASME B40.200.
2. Case: Cast aluminum; 9-inch nominal size unless otherwise indicated.
3. Case Form: Back angle or Straight unless otherwise indicated.
4. Tube: Glass with magnifying lens and blue organic liquid.
5. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
6. Window: Glass.
7. Stem: Aluminum and of length to suit installation.

a. Design for Thermowell Installation: Bare stem.

8. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
9. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.5 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.6 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Standard: ASME B40.100.
2. Case: Liquid-filled; cast aluminum or drawn steel; 4 ½-inch nominal diameter.
3. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
4. Pressure Connection: Brass, with ¼-inch or ½-inch, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Metal.
10. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.7 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with ¼-inch or ½-inch, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass ball, with ¼-inch or ½-inch, ASME B1.20.1 pipe threads.

2.8 TEST PLUGS

A. Description: Test-station fitting made for insertion into piping tee fitting.

B. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

C. Thread Size: ¼-inch or ½-inch, ASME B1.20.1 pipe thread.

D. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

E. Core Inserts: Chlorosulfonated polyethylene synthetic and EPDM self-sealing rubber.

2.9 TEST-PLUG KITS

A. Furnish one test-plug kit(s) containing one thermometer, one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.

B. Low-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch-diameter dial and tapered-end sensing element. Dial range shall be at least 25 to 125 deg F.

C. High-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch-diameter dial and tapered-end sensing element. Dial range shall be at least 0 to 220 deg F.

D. Pressure Gage: Small, Bourdon-tube insertion type with 2- to 3-inch-diameter dial and probe. Dial range shall be at least 0 to 200 psig.

E. Carrying Case: Metal or plastic, with formed instrument padding.

2.10 SIGHT FLOW INDICATORS

A. Description: Piping inline-installation device for visual verification of flow.

B. Construction: Bronze or stainless-steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.

C. Minimum Pressure Rating: 150 psig.

D. Minimum Temperature Rating: 200 deg F.

E. End Connections for 2-inch and Smaller: Threaded.

F. End Connections for 2-1/2-inch and Larger: Flanged.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

G. Install valve and snubber in piping for each pressure gage for fluids.

H. Install test plugs in piping tees.

I. Install thermometers in the following locations:

1. As indicated on Plumbing Drawings.

J. Install pressure gages in the following locations:

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Suction and discharge of each domestic water pump.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

A. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F.

B. Scale Range for Domestic Hot-Water and hot water return piping: 0 to 250 deg F.

3.5 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of water service into building shall be the following:

1. Liquid-filled, direct-mounted, metal case.

B. Pressure gages at inlet and outlet of each water pressure-reducing valve shall be the following:

1. Liquid-filled, direct-mounted, metal case.

C. Pressure gages at suction and discharge of each domestic water pump shall be the following:

1. Liquid-filled, direct-mounted, metal case.

3.6 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping: 0 to 160 psi.

END OF SECTION 220519

SECTION 220523 – GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220519	Meters and Gauges for Plumbing Piping
3.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
4.	Section 220553	Identification for Plumbing Piping and Equipment
5.	Section 221113	Facility Water Distribution Piping
6.	Section 221116	Domestic Water Piping
7.	Section 221119	Domestic Water Piping Specialties

1.2 SUMMARY

A. Section Includes:

1. Ball valves.
2. Gate valves.
3. Check valves.
4. Globe valves.
5. Butterfly valves.
6. Angle valves.
7. Chain wheels.

1.3 REFERENCES

A. ASTM International:
1. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
2. ASTM D4101 - Standard Specification for Propylene Injection and Extrusion Materials.

B. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 67 - Butterfly Valves.
2. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
3. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
4. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
5. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

C. Safe Drinking Water Act:
1. SDWA 1417 - Reduction of Lead in Drinking Water.

1.4 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.5 SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 Annex G.

2. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.

3. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.

4. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of valves.

B. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views

1.7 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. For drinking water service, provide valves complying with NSF 61.

C. All valves installed on the domestic water distribution system shall comply with SDWA 1417. Exception shall be main shut-off valve at domestic water service entrance that is 2-inches or larger.

D. All valve manufacturers shall demonstrate that valve products have been certified per NSF/ANSI Standard 372.

E. All valves installed on the domestic water system shall have labeling of lead content engraved on the valve body.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and soldered ends.
3. Set ball valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges on steel valves.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for solder-joint connections.
6. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves 4-inch and larger.
2. Handwheel: For valves other than quarter-turn types.
3. Handlever: For quarter-turn valves smaller than 4-inch.
4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

H. Valves in Insulated Piping:

1. Include 2-inch stem extensions.

2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

I. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

J. Valve Bypass and Drain Connections: MSS SP-45.

2.2 VALVE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Hammond Valve.
2. Milwaukee Valve Company
3. American Valve, Inc
4. NIBCO INC
5. Crane Co.; Crane Valve Group; Stockham Division
6. Red-White Valve Corporation
7. Victaulic
8. Tyco
9. Kennedy
10. Apollo Valve Co.
11. Watts
12. Kitz.
13. Jomar.

2.3 BRONZE BALL VALVES

A. Two-Piece, Bronze Ball Valves with Full Port and Stainless-Steel Trim:
1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Threaded or soldered.
f. Seats: PTFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel, vented.
i. Port: Full.

B. Three-Piece, Bronze Ball Valves with Full Port and Stainless-Steel Trim:
1. Description:

a. Standard: MSS SP-110.
b. CWP Rating: 600 psig.
c. Body Design: Three piece.
d. Body Material: Bronze.
e. Ends: Threaded.

f. Seats: PTFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel, vented.
i. Port: Full.

2.4 STEEL BALL VALVES

A. Class 150, Steel Ball Valves with Full Port:
1. Description:

a. Standard: MSS SP-72.
b. CWP Rating: 285 psig.
c. Body Design: Split body.
d. Body Material: Carbon steel, ASTM A 216, Type WCB.
e. Ends: Flanged or threaded.
f. Seats: PTFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel, vented.
i. Port: Full.

2.5 IRON BALL VALVES

A. Class 150, Iron Ball Valves:
1. Description:

a. Standard: MSS SP-72.
b. CWP Rating: 200 psig.
c. Body Design: Split body.
d. Body Material: ASTM A 126, gray iron.
e. Ends: Flanged or threaded.
f. Seats: PTFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel.
i. Port: Full.

2.6 BRONZE GATE VALVES

A. Class 150, NRS, Bronze Gate Valves:
1. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 300 psig.
c. Body Material: Bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.

2.7 IRON GATE VALVES

A. Class 125, NRS, Iron Gate Valves:
1. Description:

a. Standard: MSS SP-70, Type I.
b. CWP Rating: 200 psig.
c. Body Material: Gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Disc: Solid wedge.
g. Packing and Gasket: Asbestos free.

B. Class 125, OS&Y, Iron Gate Valves:
1. Description:

a. Standard: MSS SP-70, Type I.
b. CWP Rating: 200 psig.
c. Body Material: Gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Disc: Solid wedge.
g. Packing and Gasket: Asbestos free.

2.8 CHAINWHEELS

A. Description: Valve actuation assembly with sprocket rim, chain guides, chain, and attachment brackets for mounting chain wheels directly to hand wheels.

1. Sprocket Rim with Chain Guides: Ductile or cast iron, of type and size required for valve. Include epoxy coating.
2. Chain: Hot-dip galvanized steel, of size required to fit sprocket rim.

2.9 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Bronze Disc:
1. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Design: Vertical flow.
d. Body Material: ASTM B 61 or ASTM B 62, bronze.
e. Ends: Threaded or soldered. See valve schedule articles.
f. Disc: Bronze.

2.10 BRONZE SWING CHECK VALVES

A. Class 125, Bronze, Swing Check Valves with Bronze Disc:
1. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.

c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded or soldered. See valve schedule articles.
f. Disc: Bronze.

B. Class 150, Bronze Swing Check Valves with Bronze Disc:
1. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 300 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded or soldered. See valve schedule articles.
f. Disc: Bronze.

2.11 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats:
1. Description:

a. Standard: MSS SP-71, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged or threaded. See valve schedule articles.
f. Trim: Bronze.
g. Gasket: Asbestos free.

2.12 IRON SWING CHECK VALVES WITH CLOSURE CONTROL

A. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:
1. Description:

a. Standard: MSS SP-71, Type I.
b. CWP Rating: 200 psig.
c. Body Design: Clear or full waterway.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Flanged or threaded. See valve schedule articles.
f. Trim: Bronze.
g. Gasket: Asbestos free.
h. Closure Control: Factory-installed exterior lever and weight.

2.13 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP, Iron, Grooved-End Swing Check Valves:
1. Description:

a. CWP Rating: 300 psig.
b. Body Material: ASTM A 536, ductile iron.
c. Seal: EPDM.
d. Disc: Spring operated, ductile iron or stainless steel.

2.14 IRON, CENTER-GUIDED, SPRING-LOADED CHECK VALVES

A. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 200 psig.
c. Body Material: ASTM A 126, gray iron.
d. Style: Compact wafer, spring loaded.
e. Seat: Bronze.

B. Class 125, Iron, Globe, Center-Guided Check Valves with Metal Seat:
1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 200 psig.
c. Body Material: ASTM A 126, gray iron.
d. Style: Globe, spring loaded.
e. Ends: Flanged.
f. Seat: Bronze.

C. Class 150, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 300 psig.
c. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
d. Style: Compact wafer, spring loaded.
e. Seat: Bronze.

D. Class 150, Iron, Globe, Center-Guided Check Valves with Metal Seat:
1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 300 psig.
c. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
d. Style: Globe, spring loaded.
e. Ends: Flanged.
f. Seat: Bronze.

E. Class 125, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 200 psig.
c. Body Material: ASTM A 126, gray iron.
d. Style: Globe, spring loaded.
e. Ends: Flanged.
f. Seat: EPDM.

F. Class 150, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
1. Description:

a. Standard: MSS SP-125.
b. CWP Rating: 300 psig.

c. Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
d. Style: Globe, spring loaded.
e. Ends: Flanged.
f. Seat: EPDM or NBR.

G. Class 250, Iron, Globe, Center-Guided Check Valves with Resilient Seat:

a. Standard: MSS SP-125.
b. CWP Rating: 400 psig.
c. Body Material: ASTM A 126, gray iron.
d. Style: Globe, spring loaded.
e. Ends: Flanged.
f. Seat: EPDM or NBR.

2.15 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron.

2.16 IRON GLOBE VALVES

A. Class 125, Iron Globe Valves:

a. Standard: MSS SP-85, Type I.
b. CWP Rating: 200 psig.
c. Body Material: ASTM A 126, gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Packing and Gasket: Asbestos free.

B. Class 250, Iron Globe Valves:

a. Standard: MSS SP-85, Type I.
b. CWP Rating: 500 psig.
c. Body Material: ASTM A 126, gray iron with bolted bonnet.
d. Ends: Flanged.
e. Trim: Bronze.
f. Packing and Gasket: Asbestos free.

2.17 IRON, FLANGE BUTTERFLY VALVES

A. 200 CWP, Iron, Flange Butterfly Valves with EPDM Seat and Stainless-Steel Disc:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 200 psig.

c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: EPDM.
f. Stem: One- or two-piece stainless steel.
g. Disc: Stainless steel.

2.18 IRON, GROOVED-END BUTTERFLY VALVES

A. 175 CWP, Iron, Grooved-End Butterfly Valves:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 175 psig.
c. Body Material: Coated, ductile iron.
d. Stem: Two-piece stainless steel.
e. Disc: Coated, ductile iron.
f. Seal: EPDM.

2.19 BRONZE ANGLE VALVES

A. Class 125, Bronze Angle Valves with Bronze Disc:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron.

B. Class 150, Bronze Angle Valves with Bronze Disc:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 300 psig.
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install chainwheels on operators for gate valves 4-inch and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor

F. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.
3. Lift Check Valves: With stem upright and plumb.

G. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. If valve applications are not indicated, use the following:

1. Shutoff Service: Gate valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service: Globe or ball valves.

C. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

D. Select valves except wafer types with the following end connections:

1. For Copper Tubing, 2-1/2-inch to 4-inch: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
2. For Copper Tubing, 5-inch and Larger: Flanged ends.
3. For Steel Piping, 2-inch and Smaller: Threaded ends.
4. For Steel Piping, 2-1/2-inch to 4-inch: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
5. For Steel Piping, 5-inch and Larger: Flanged ends.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe 2-inch and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
2. Two-piece, bronze ball valves with full port and stainless-steel trim.
3. Three-piece, bronze ball valves with full port and stainless-steel trim.

B. Pipe 2-1/2-inch and Larger:

1. Steel and Iron Valves, 2-1/2-inch to 4-inch: May be provided with threaded ends instead of flanged ends.
2. Two-piece, bronze ball valves with full port and stainless-steel trim.
3. Three-piece, bronze ball valves with full port and stainless-steel trim.
4. Class 150, steel ball valves with full port.
5. Class 150, iron ball valves.

3.6 SANITARY-WASTE AND STORM-DRAINAGE VALVE SCHEDULE

A. Pipe 2-inch and Smaller:
1. Bronze Swing Check Valves: Class 150, bronze disc.
2. Bronze Gate Valves: Class 150, NRS.
3. Bronze Globe Valves: Class 150, bronze disc.

B. Pipe 2-1/2-inch and Larger:

1. Iron Valves, 2-1/2-inch to 4-inch: May be provided with threaded ends instead of flanged ends.
2. Iron Swing Check Valves: Class 125, metal seats.
3. Iron Swing Check Valves with Closure Control: Class 125, lever and spring.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

C. Related Sections:

1. Section 220100 Plumbing General Requirements
2. Section 220516 Expansion Fittings and Loops for Plumbing Piping
3. Section 220523 General Duty Valves for Plumbing Piping
4. Section 220548 Vibration and Seismic Controls for Plumbing Piping and Equipment
5. Section 220719 Plumbing Piping Insulation
6. Section 221116 Domestic Water Piping
7. Section 221125 Natural Gas Piping
8. Section 221316 Sanitary Waste and Vent Piping
9. Section 221413 Storm Drainage Piping
10. Section 221423 Storm Drainage Piping Specialties

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fiberglass pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Thermal-hanger shield inserts.
7. Fastener systems.
8. Pipe stands.
9. Pipe positioning systems.
10. Equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports (Inside Building):

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:
1. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
2. Standard: MFMA-4.
3. Channels: Continuous slotted steel channel with inturned lips.
4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
6. Metallic Coating: Hot-dipped galvanized.
7. Paint Coating: Epoxy.
8. Plastic Coating: Epoxy.

B. Non-MFMA Manufacturer Metal Framing Systems:
1. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
2. Standard: Comply with MFMA-4.
3. Channels: Continuous slotted steel channel with inturned lips.
4. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
6. Coating: Zinc.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Hot and Cold Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

B. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

C. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

D. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, stainless-steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Stainless steel.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.9 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

G. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, 2-1/2-inch and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe 4-inch and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe 4-inch and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. ¼-inch to 3-inch: 12 inches long and 0.048 inch thick.
    b. 4-inch: 12 inches long and 0.06 inch thick.
    c. 5-inch and 6-inch: 18 inches long and 0.06 inch thick.
    d. 8-inch to 14-inch: 24 inches long and 0.075 inch thick.
    e. 16-inch to 24-inch: 24 inches long and 0.105 inch thick.

5. Pipes 8-inch and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports**.**

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes ½-inch to 12-inch.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes 4-inch to 24-inch, requiring up to 4-inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes ¾-inch to 12-inch, requiring clamp flexibility and up to 4-inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes ½-inch to 12-inch if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes ½-inch to 4-inch, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes ¾-inch to 8-inch.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes ½-inch to 8-inch.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes ½-inch to 8-inch.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes ½-inch to 8-inch.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes 3/8-inch to 8-inch.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes 3/8-inch to 3-inch.
12. U-Bolts (MSS Type 24): For support of heavy pipes ½-inch to 12-inch.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes 4-inch to 12-inch, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes 4-inch to 12-inch, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.

16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes 2-1/2-inch to 12-inch if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes 1-inch to 12-inch, from two rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes 2-1/2-inch to 12-inch, from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes 2-inch to 12-inch if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes 2-inch to 12-inch if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes 2-inch to 12-inch if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers ¾-inch to 12-inch.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers ¾-inch to 12-inch if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6-inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.

12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

R. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220548 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220516	Expansion Fittings and Loops for Plumbing Piping
3.	Section 220517	Sleeves and Sleeve Seals for Plumbing Piping
4.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
5.	Section 221116	Domestic Water Piping
6.	Section 221125	Natural Gas Piping
7.	Section 221316	Sanitary Waste and Vent Piping
8.	Section 221413	Storm Drainage Piping

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Open-spring isolators.
5. Housed-spring isolators.
6. Restrained-spring isolators.
7. Housed-restrained-spring isolators.
8. Pipe-riser resilient supports.
9. Resilient pipe guides.
10. Elastomeric hangers.
11. Spring hangers.
12. Snubbers.
13. Restraint channel bracings.
14. Restraint cables.
15. Seismic-restraint accessories.
16. Mechanical anchor bolts.
17. Adhesive anchor bolts.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.

a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment.

2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.

1. Include design calculations and details for selecting vibration isolators and seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, due to seismic forces required to select vibration isolators, and due to seismic restraints.
3. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.
4. Seismic-Restraint Details:

a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
d. Preapproval and Evaluation Documentation: By an evaluation service member of ICC-ES, OSHPD or an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for plumbing piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.

B. Qualification Data: For professional engineer and testing agency.

C. Welding certificates.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: [A] [B] [C] [D] [E] [F].
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: [I] [II] [III].

    a. Component Importance Factor: 1.0.
    b. Component Response Modification Factor: 1.5.
    c. Component Amplification Factor: 1.0.

3. Design Spectral Response Acceleration at Short Periods (0.2 Second).
4. Design Spectral Response Acceleration at 1.0-Second Period.
5. Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

    a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they are subjected.

2.2 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads.
1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
2. Size: Factory or field cut to match requirements of supported equipment.
3. Pad Material: Oil and water resistant with elastomeric properties.

4. Surface Pattern: Smooth pattern.
5. Infused nonwoven cotton or synthetic fibers.
6. Load-bearing metal plates adhered to pads.
7. Sandwich-Core Material: Resilient and elastomeric.

    a. Surface Pattern: Smooth pattern.
    b. Infused nonwoven cotton or synthetic fibers.

2.3 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts.
1. Mounting Plates:

    a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
    b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

2. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.4 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts.
1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

    a. Housing: Cast-ductile iron or welded steel.
    b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.5 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators.
1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.6 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing.
1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.

4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.

    a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    b. Top housing with elastomeric pad.

2.7 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint.
1. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.

    a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    b. Top plate with elastomeric pad.
    c. Internal leveling bolt that acts as blocking during installation.

2. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.8 HOUSED-RESTRAINED-SPRING ISOLATORS

A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing.
1. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.

    a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.9 PIPE-RISER RESILIENT SUPPORT

A. Description: All-directional, acoustical pipe anchor consisting of two steel tubes separated by a minimum 1/2-inch thick neoprene.

1. Vertical-Limit Stops: Steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions.
2. Maximum Load Per Support: 500 psig on isolation material providing equal isolation in all directions.

2.10 RESILIENT PIPE GUIDES

A. Description: Telescopic arrangement of two steel tubes or post and sleeve arrangement separated by a minimum 1/2-inch thick neoprene.

1. Factory-Set Height Guide with Shear Pin: Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.11 ELASTOMERIC HANGERS

A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods.
1. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
2. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.12 SPRING HANGERS

A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
8. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.13 SNUBBERS

A. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
3. Maximum 1/4-inch air gap, and minimum 1/4-inch thick resilient cushion.

2.14 RESTRAINT CHANNEL BRACINGS

A. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.15 RESTRAINT CABLES

A. Restraint Cables: ASTM A 603 galvanized-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.16 SEISMIC-RESTRAINT ACCESSORIES

A. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

B. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.

C. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.

E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.17 MECHANICAL ANCHOR BOLTS

A. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.18 ADHESIVE ANCHOR BOLTS

A. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES, OSHPD or an agency acceptable to authorities having jurisdiction.

B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Division 3.

B. Installation of vibration isolators must not cause any change of position of equipment or piping resulting in stresses or misalignment.

C. Comply with requirements in Section 077200 "Roof Accessories" for installation of equipment supports and roof penetrations.

D. Equipment Restraints:

1. Install seismic snubbers on plumbing equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD or an agency acceptable to authorities having jurisdiction that provides required submittals for component.

E. Piping Restraints:

1. Comply with requirements in MSS SP-127.
2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
3. Brace a change of direction longer than 12 feet.

F. Install cables so they do not bend across edges of adjacent equipment or building structure.

G. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES, OSHPD or an agency acceptable to authorities having jurisdiction that provides required submittals for component.

H. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

I. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

J. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

K. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 221116 "Domestic Water Piping" and Section 221125 “Natural Gas Pipe” for piping flexible connections.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.

4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

END OF SECTION 220548

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220523	General Duty Valves for Plumbing Piping
3.	Section 221116	Domestic Water Piping
4.	Section 221125	Natural Gas Piping
5.	Section 221316	Sanitary Waste and Vent Piping
6.	Section 221413	Storm Drainage Piping

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.
5. Warning tags.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
5. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
6. Fasteners: Stainless-steel self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8-inch-thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8-inch-thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless-steel self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: Size letters according to ASME A13.1 for piping (minimum of ½-inch).

2.4 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link chain or beaded chain.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches.

2. Fasteners: Reinforced grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Piping Color Coding: Painting of piping is specified in Division 9.

B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.

C. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

E. Pipe Label Color Schedule:

1. Domestic Water Piping

   a. Background: Safety green.
   b. Letter Colors: White.

2. Sanitary Waste and Storm Drainage Piping:

   a. Background Color: Safety white.
   b. Letter Color: Black.

3. Natural Gas Piping:
   a. Background Color: Yellow
   b. Letter Color: Black

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

   a. Hot and Cold Water: 1-1/2 inches, round.
   b. Natural Gas: 1-1/2 inches, round.

2. Valve-Tag Colors:

   a. Cold Water: Natural.
   b. Hot Water: Natural.

3. Letter Colors:

   a. Hot and Cold Water: Black.

   b. Natural Gas: Black

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220523	General Duty Valves for Plumbing Piping
3.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
4.	Section 220553	Identification for Plumbing Piping and Equipment
5.	Section 221116	Domestic Water Piping
6.	Section 221413	Storm Drainage Piping
7.	Section 221423	Storm Drainage Piping Specialties
8.	Section 224300	Plumbing Fixtures

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. Domestic chilled-water piping for drinking fountains.
5. Sanitary waste piping exposed to freezing conditions.
6. Storm-water piping exposed to freezing conditions.
7. Roof drains and rainwater leaders.
8. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 REFERENCE STANDARDS

A. ASTM International (ASTM).

B. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE).

C. North American Insulation Manufacturers Association (NAIMA).

D. NAIMA – "Guide to Insulating Chilled Water Piping Systems with Mineral Fiber Pipe Insulation."

E. "National Commercial & Industrial Insulation Standards" – MICA Manual.

F. National Fire Protection Association (NFPA).

G. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

H. Underwriter's Laboratories (UL).

I. Underwriter's Laboratories Environmental (UL Environment).

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches long by 2-inches.
2. Jacket Materials for Pipe: 12 inches long by 2-inches.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.

1. Piping Mockups:

a. One 10-foot section of 2-inch straight pipe.
b. One each of a 90-degree threaded, welded, and flanged elbow.
c. One each of a threaded, welded, and flanged tee fitting.
d. One 2-inch or smaller valve, and one 2-1/2-inch or larger valve.
e. Four support hangers including hanger shield and insert.
f. One threaded strainer and one flanged strainer with removable portion of insulation.
g. One threaded reducer and one welded reducer.
h. One pressure temperature tap.
i. One mechanical coupling.

2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting insulation application.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

D. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ANSI A117.1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.8 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing with Electrical Contractor.

1.9 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Fiberglass: Inorganic, incombustible, molded of heavy density resin bonded inorganic glass fibers.
1. Density: ASTM C 302.
2. Operating Temp. Range: ASTM C 411.
3. Jacket Temp Limitation: ASTM C 1136.
4. Jacket Permeance: ASTM E 96.

B. Mineral-Fiber, Preformed Pipe Insulation:

1. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL.

C. Phenolic:
1. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
2. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
3. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
4. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.

D. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

E. Products shall not contain asbestos, lead, mercury, or mercury compounds.

F. Composite surface burning characteristic shall comply with ASTM E84.

G. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. PVC Jacket Adhesive: Compatible with PVC jacket.

1. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
4. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
2. Service Temperature Range: 0 to 180 deg F.
3. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
4. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch (1.6-mm) dry film thickness.
2. Service Temperature Range: Minus 20 to plus 180 deg F.
3. Solids Content: 60 percent by volume and 66 percent by weight.
4. Color: White.

2.5 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. PVC Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.
5. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.7 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Adhesive: As recommended by jacket material manufacturer.
2. Color: White.
3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.8 TAPES

A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Width: 2 inches.
2. Thickness: 6 mils.
3. Adhesion: 64 ounces force/inch in width.
4. Elongation: 500 percent.
5. Tensile Strength: 18 lbf/inch in width.

2.9 SECUREMENTS

A. Bands:

1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015-inch-thick, 1/2-inch-wide with wing seal or closed seal.
2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020-inch-thick, 1/2-inch-wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

C. Wire: 0.062-inch soft-annealed, stainless steel.

2.10 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:
1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. All indoor exposed plumbing piping that requires insulation shall be provided with a PVC jacket.

M. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

N. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

O. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

P. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

Q. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF FIBERGLASS INSULATION

A. General Installation Requirements:

1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with 0.062-inch wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.

B. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

E. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. 1-inch and Smaller: Insulation shall be one of the following:

a. Fiberglass: 1/2-inch thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2-inch thick.

2. 1 1/4-inch and Larger: Insulation shall be one of the following:

a. Fiberglass: 1-inch thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-inch thick.

B. Domestic Hot and Recirculated Hot Water:

1. 1 1/4-inch and Smaller: Insulation shall be one of the following:

a. Fiberglass: 1 inch thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-inch thick.

2. 1-1/2-inch and Larger: Insulation shall be one of the following:

a. Fiberglass: 1-1/2 inches thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.

C. Storm-water and Overflow (Horizontal piping and first 3 feet of vertical drop):

1. All Pipe Sizes: Insulation shall be one of the following:

a. Fiberglass: 1-inch thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
c. Phenolic: 1 inch thick.

D. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Fiberglass: 1-inch thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
c. Phenolic: 1 inch thick.

E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be PVC.

F. Gresase Waste Piping Where Heat Tracing Is Installed:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Fiberglass: 1 1/2-inch thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.

G. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Fiberglass: 1-inch thick.
b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch-thick.

H. Hot Service Drains:

1. All Pipe Sizes: Insulation shall be one of the following:

a. Fiberglass: 1-inches thick.
b. Mineral-Fiber, Preformed Pipe, Type I or II: 1-inch thick.

3.12 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Exposed:

1. PVC: 20 mils thick.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220516	Expansion Fittings and Loops for Plumbing Piping
3.	Section 220517	Sleeves and Sleeve Seals for Plumbing Piping
4.	Section 220518	Escutcheons for Plumbing Piping
5.	Section 220519	Meters and Gauges for Plumbing Piping
6.	Section 220523	General Duty Valves for Plumbing Piping
7.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
8.	Section 220548	Vibration and Seismic Controls for Plumbing Piping and Equipment
9.	Section 220553	Identification for Plumbing Piping and Equipment
10.	Section 220719	Plumbing Piping Insulation
11.	Section 221119	Domestic Water Piping Specialties
12.	Section 224300	Plumbing Fixtures

1.2 SUMMARY

A. Section Includes:

1. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
2. Encasement for piping.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
2. ASME B16.3 - Malleable Iron Threaded Fittings.
3. ASME B16.4 - Gray Iron Threaded Fittings.
4. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
5. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
6. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
7. ASME B31.9 - Building Services Piping.
8. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.

B. ASTM International:
1. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

4. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
5. ASTM A536 - Standard Specification for Ductile Iron Castings.
6. ASTM B32 - Standard Specification for Solder Metal.
7. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
8. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
9. ASTM B75 - Standard Specification for Seamless Copper Tube.
10. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
11. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
12. ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes.

C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

D. American Water Works Association:
1. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
4. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.

E. NSF International:
1. NSF 61 - Standard for Drinking Water System Components - Health Effects.

F. Safe Drinking Water Act:
1. SDWA 1417 - Standard for Lead Free Drinking Water.

1.4 SUBMITTALS

A. Product Data: For the following products:

1. Transition fittings.
2. Dielectric fittings.

B. System purging and disinfecting activities report.

C. Field quality-control reports.

1.5 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61 for potable domestic water piping and components.

C. All components of the potable domestic water system shall meet the requirements of SDWA-1417.

1.7 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Architect, Construction Manager and Owner no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Architect's, Construction Manager's and Owner's written permission.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K or ASTM B 88, Type L water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.

G. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

H. Copper-Tube, Extruded-Tee Connections:
1. Description: Tee formed in copper tube according to ASTM F 2014.

I. Appurtenances for Grooved-End Copper Tubing:
   1. Bronze Fittings for Grooved-End, Copper Tubing: ASTM B 75 copper tube or ASTM B 584 bronze castings.
   2. Mechanical Couplings for Grooved-End Copper Tubing:

      a. Copper-tube dimensions and design similar to AWWA C606.
      b. Ferrous housing sections.
      c. EPDM-rubber gaskets suitable for hot and cold water.
      d. Bolts and nuts.
      e. Minimum Pressure Rating: 300 psig.

J. Press Fit Connections:
   1. Press Fitting: Copper and copper alloy press fittings conforming to ASME B16.18 or ASME B16.22. Sealing elements for press fittings shall be EPDM and factory installed. Press ends shall have SC feature design (leakage path) to assure detection and easy identification of leakage of liquids from inside the system past the sealing element of an unpressed connection.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe:

   1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
   2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

   1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
   2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.5 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105/A21.5.

B. Form: Sheet or tube.

C. Color: Black or natural.

2.6 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

2.7 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
1. Standard: ASSE 1079.
2. Pressure Rating: 125 psig minimum at 180 deg F 150 psig.
3. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:
1. Standard: ASSE 1079.
2. Factory-fabricated, bolted, companion-flange assembly.
3. Pressure Rating: 125 psig minimum at 180 deg F 150 psig.
4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:
1. Nonconducting materials for field assembly of companion flanges.
2. Pressure Rating: 150 psig.
3. Gasket: Neoprene or phenolic.
4. Bolt Sleeves: Phenolic or polyethylene.
5. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:
1. Standard: IAPMO PS 66.
2. Electroplated steel nipple complying with ASTM F 1545.
3. Pressure Rating and Temperature: 300 psig at 225 deg F.
4. End Connections: Male threaded or grooved.
5. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105/A21.5.

E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

F. Install shutoff valve immediately upstream of each dielectric fitting.

G. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

H. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

K. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

L. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

M. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

N. Install piping to permit valve servicing.

O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

P. Install piping free of sags and bends.

Q. Install fittings for changes in direction and branch connections.

R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

S. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."

T. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

G. Joint Construction for Grooved-End Copper Tubing: Make joints according to AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

H. Joint Construction for Grooved-End, Ductile-Iron Piping: Make joints according to AWWA C606. Cut round-bottom grooves in ends of pipe at gasket-seat dimension required for specified (flexible or rigid) joint. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

I. Joint Construction for Grooved-End Copper Piping: Make joints according to AWWA C606. Square cut Roll groove ends of pipe as specified. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

J. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

K. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for 1-1/2-inch and Smaller: Fitting-type coupling.
2. Fittings for 2-inch and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping 2-inch and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for 2-inch and Smaller: Use dielectric couplings couplings or nipples.

C. Dielectric Fittings for 2-1/2-inch to 4-inch: Use dielectric flanges flange kits.

D. Dielectric Fittings for 5-inch and Larger: Use dielectric flange kits.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. 3/4-inch and Smaller: 60 inches with 3/8-inch rod.
2. 1-inch and 1-1/4-inch: 72 inches with 3/8-inch rod.
3. 1-1/2-inch and 2-inch: 96 inches with 3/8-inch rod.
4. 2-1/2-inch: 108 inches with 1/2-inch rod.
5. 3-inch to 5-inch: 10 feet with 1/2-inch rod.

6. 6-inch: 10 feet with 5/8-inch rod.
7. 8-inch: 10 feet with 3/4-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. 1-1/4-inch and Smaller: 84 inches with 3/8-inch rod.
2. 1-1/2-inch: 108 inches with 3/8-inch rod.
3. 2-inch: 10 feet with 3/8-inch rod.
4. 2-1/2-inch: 11 feet with 1/2-inch rod.
5. 3-inch: 12 feet with 1/2-inch rod.
6. 4-inch and 5-inch: 12 feet with 5/8-inch rod.
7. 6-inch: 12 feet with 3/4-inch rod.
8. 8-inch to 12-inch: 12 feet with 7/8-inch rod.

H. Install supports for vertical steel piping every 15 feet.

I. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
2. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for 2-1/2-inch and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

    a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
    b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

        1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
        2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

    c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
    d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

    a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
    b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
    c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
    d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
    e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
    f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.

6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, 3-inch and smaller, shall be the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.

E. Under-building-slab, domestic water, building-service piping, 4-inch to 8-inch, shall be the following:
1. Mechanical-joint, ductile-iron pipe; standard-pattern, mechanical-joint fittings; and mechanical joints.

F. Under-building-slab, combined domestic water, building-service, and fire-service-main piping, 6-inch to 12-inch, shall be one of the following:

1. Mechanical-joint, ductile-iron pipe; standard pattern, mechanical-joint fittings; and mechanical joints.
2. Push-on-joint, ductile-iron pipe; standard pattern, push-on-joint fittings; and gasketed joints.
3. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.

G. Under-building-slab, domestic water piping, 2-inch and smaller, shall be the following:

1. Soft Hard copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.

H. Aboveground domestic water piping, 2-inch and smaller, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered brazed joints.
2. Hard copper tube, ASTM B 88, Type L; wrought-copper, press-fit fittings; and press-fit joints.
3. Hard copper tube, ASTM B 88, Type L; wrought-copper, grooved end tubing and fittings; and mechanical couplings.

I. Aboveground domestic water piping, 2-1/2-inch to 4-inch, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered brazed joints.
2. Hard copper tube, ASTM B 88, Type L; wrought-copper, press-fit fittings; and press-fit joints.
3. Hard copper tube, ASTM B 88, Type L; wrought-copper, grooved end tubing and fittings; and mechanical couplings.

3.13 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball valves for piping 2-inch and smaller. Use ball, or gate valves with flanged ends for piping 2-1/2-inch and larger.
2. Throttling Duty: Use ball valves for piping 2-inch and smaller. Use ball valves with flanged ends for piping 2-1/2-inch and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Calibrated Memory-stop balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220519	Meters and Gauges for Plumbing Piping
3.	Section 220523	General Duty Valves for Plumbing Piping
4.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
5.	Section 220553	Identification for Plumbing Piping and Equipment
6.	Section 221116	Domestic Water Piping
7.	Section 224300	Plumbing Fixtures

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated, water mixing valves.
6. Strainers.
7. Hose bibbs.
8. Drain valves.
9. Water-hammer arresters.
10. Air vents.
11. Trap-seal primer valves.
12. Trap-seal primer systems.
13. Trap guards.
14. Specialty valves.
15. Flexible connectors.

1.3 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.4 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

1. Include diagrams for power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. NSF Compliance:

1. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14.

2.2 VACUUM BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Febco.
2. Watts.
3. Conbraco.

B. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
1. Standard: ASSE 1001.
2. Size: 1/4-inch to 3-inch, as required to match connected piping.
3. Body: Bronze.
4. Inlet and Outlet Connections: Threaded.
5. Finish: Chrome plated.

C. Hose-Connection Vacuum Breakers:
1. Standard: ASSE 1011.
2. Body: Bronze, nonremovable, with manual drain.
3. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
4. Finish: Chrome.

2.3 BACKFLOW PREVENTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Febco.
2. Watts.

3. Conbraco.

B. Intermediate Atmospheric-Vent Backflow Preventers:
1. Standard: ASSE 1012.
2. Operation: Continuous-pressure applications.
3. Size: Refer to Plumbing Drawings.
4. Body: Bronze.
5. End Connections: Solder joint.
6. Finish: Rough bronze.

C. Reduced-Pressure-Principle Backflow Preventers:
1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 12 psig maximum, through middle third of flow range.
4. Size: Refer to Plumbing Drawings.
5. Body: Bronze for 2inch and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for 2-1/2-inch and larger.
6. End Connections: Threaded for 2-inch and smaller; flanged or grooved for 2-1/2-inch and larger.
7. Configuration: Designed for horizontal, straight-through flow.
8. Accessories:

a. Valves 2-inch and Smaller: Ball type with threaded ends on inlet and outlet.
b. Valves 2-1/2-inch and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

D. Double-Check, Backflow-Prevention Assemblies:
1. Standard: ASSE 1015.
2. Operation: Continuous-pressure applications unless otherwise indicated.
3. Pressure Loss: 5 psig maximum, through middle third of flow range.
4. Size: Refer to Plumbing Drawings.
5. Body: Bronze for 2-inch and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for 2-1/2-inch and larger.
6. End Connections: Threaded for 2-inch and smaller; flanged or Grooved for 2-1/2-inch and larger.
7. Configuration: Designed for horizontal, straight-through flow.
8. Accessories:

a. Valves 2-inch and Smaller: Ball type with threaded ends on inlet and outlet.
b. Valves 2-1/2-inch and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

E. Beverage-Dispensing-Equipment Backflow Preventers:
1. Operation: Continuous-pressure applications.
2. Size: 1/4-inch or 3/8-inch.
3. Body: Stainless steel.
4. End Connections: Threaded.

F. Dual-Check-Valve Backflow Preventers:
1. Standard: ASSE 1024.
2. Operation: Continuous-pressure applications.
3. Size: Refer to Plumbing Drawings.
4. Body: Bronze with union inlet.

G. Carbonated-Beverage-Dispenser, Dual-Check-Valve Backflow Preventers:
1. Standard: ASSE 1032.
2. Operation: Continuous-pressure applications.

3. Size: 1/4-inch or NPS 3/8-inch.
4. Body: Stainless steel.
5. End Connections: Threaded.

H. Double-Check, Detector-Assembly Backflow Preventers:
1. Standard: ASSE 1048 and is FM Global approved or UL listed.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 5 psig maximum, through middle third of flow range.
4. Size: Refer to Plumbing Drawings.
5. Body: Cast iron with interior lining that complies with AWWA C550 or that is FDA approved.
6. End Connections: Flanged.
7. Configuration: Designed for horizontal, straight-through flow.
8. Accessories:

a. Valves: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
b. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

I. Hose-Connection Backflow Preventers:
1. Operation: Up to 10-foot head of water back pressure.
2. Inlet Size: 1/2-inch or 3/4-inch.
3. Outlet Size: Garden-hose thread complying with ASME B1.20.7.
4. Capacity: At least 3-gpm flow.

J. Backflow-Preventer Test Kits:
1. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.4 WATER PRESSURE-REDUCING VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cash Acme.
2. Watts.
3. Conbraco.
4. CLA-VAL Automatic Control Valves.

B. Water Regulators:
1. Standard: ASSE 1003.
2. Pressure Rating: Initial working pressure of 150 psig**.**
3. Size: Refer to Plumbing Drawings.
4. Body: Bronze for 2-inch and smaller; cast iron for 2-1/2-inch and 3-inch.
5. Valves for Booster Heater Water Supply: Include integral bypass.
6. End Connections: Threaded for 2-inch and smaller; flanged for 2-1/2-inch and 3-inch.

C. Water-Control Valves:
1. Description: Pilot-operated, diaphragm-type, single-seated, main water-control valve.
2. Pressure Rating: Initial working pressure of 150 psig minimum with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot-control valve, restrictor device, specialty fittings, and sensor piping.
3. Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.

a. Size: Refer to Plumbing Drawings**.**
b. Pattern: Globe Angle-valve design.

c. Trim: Stainless steel.

4. .

5. End Connections: Threaded for 2-inch and smaller; flanged for 2-1/2-inch and larger.

2.5 BALANCING VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Armstrong International, Inc.
2. Watts.
3. ITT Industries; Bell & Gossett Div.
4. Taco Inc.
5. Flo Fab Inc.

B. Copper-Alloy Calibrated Balancing Valves:
1. Type: Ball Y-pattern globe valve with two readout ports and memory-setting indicator.
2. Body: Bronze.
3. Size: Same as connected piping, but not larger than 2-inch.
4. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

C. Cast-Iron Calibrated Balancing Valves:
1. Type: Adjustable with Y-pattern globe valve, two readout ports, and memory-setting indicator.
2. Size: Same as connected piping, but not smaller than 2-1/2-inch.

D. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

E. Memory-Stop Balancing Valves:
1. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: 2-inch or smaller.
4. Body: Copper alloy.
5. Port: Standard or full port.
6. Ball: Chrome-plated brass.
7. Seats and Seals: Replaceable.
8. End Connections: Solder joint or threaded.
9. Handle: Vinyl-covered steel with memory-setting device.

2.6 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Armstrong International, Inc.
2. Lawler.
3. Leonard.
4. Watts.
5. Symmons.
6. Powers.

B. Water-Temperature Limiting Devices:
1. Standard: ASSE 1017.
2. Pressure Rating: 125 psig.
3. Type: Thermostatically controlled, water mixing valve.
4. Material: Bronze body with corrosion-resistant interior components.
5. Connections: Threaded or union inlets and outlet.

6. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Tempered-Water Setting: 110 deg F.
8. Valve Finish: Chrome plated.

C. Primary, Thermostatic, Water Mixing Valves:
1. Standard: ASSE 1017.
2. Pressure Rating: 125 psig minimum unless otherwise indicated.
3. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
4. Material: Bronze body with corrosion-resistant interior components.
5. Connections: Threaded or union inlets and outlet.
6. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
7. Tempered-Water Setting: 110 deg F.
8. Valve Finish: Chrome plated.
9. Piping Finish: Copper.
10. Cabinet: Factory fabricated, stainless steel, for recessed or surface mounting and with hinged, stainless-steel door.

2.7 STRAINERS FOR DOMESTIC WATER PIPING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cash Acme.
2. Watts.
3. Conbraco.
4. CLA-VAL Automatic Control Valves.

B. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for 2-inch and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for 2-1/2-inch and larger.
3. End Connections: Threaded for 2-inch and smaller; flanged for 2-1/2-inch and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:

a. Strainers 2-inch and Smaller: 0.020 inch.
b. Strainers 2-1/2-inch to 4-inch: 0.045 inch.
c. Strainers 5-inch and Larger: 0.10 inch.

6. Drain: Factory-installed, hose-end drain valve or Pipe plug.

2.8 HOSE BIBBS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Josam Company.
2. JR Smith.
3. Watts.
4. Woodford.

B. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: ½-inch or ¾-inch threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral or field-installation, non-removable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Chrome or nickel plated.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle**.**
12. Operation for Service Areas: Wheel handle.
13. Include integral wall flange with each chrome- or nickel-plated hose bibb.
    a. .

2.9 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: 3/4-inch.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

B. Gate-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-80 for gate valves.
2. Pressure Rating: Class 125.
3. Size: 3/4-inch.
4. Body: ASTM B 62 bronze.
5. Inlet: 3/4-inch threaded or solder joint.
6. Outlet: Garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

C. Stop-and-Waste Drain Valves:

1. Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
2. Pressure Rating: 200-psig minimum CWP or Class 125.
3. Size: 3/4-inch.
4. Body: Copper alloy or ASTM B 62 bronze.
5. Drain: 1/8-inch side outlet with cap.

2.10 WATER-HAMMER ARRESTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Josam Company.

2. PPP Inc.
3. Watts.
4. JR Smith.
5. Sioux Chief.

B. Water-Hammer Arresters:
1. Standard: ASSE 1010 or PDI-WH 201.
2. Type: Copper tube with piston.
3. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.11 AIR VENTS

A. Bolted-Construction Automatic Air Vents:

1. Body: Bronze.
2. Pressure Rating and Temperature: 125-psig minimum pressure rating at 140 deg F.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: 1/2-inch minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

B. Welded-Construction Automatic Air Vents:

1. Body: Stainless steel.
2. Pressure Rating: 150-psig minimum pressure rating.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: 3/8-inch minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

2.12 TRAP-SEAL PRIMER DEVICE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. JR Smith.
2. PPP Inc.
3. Watts.
4. Sioux Chief.

B. Supply-Type, Trap-Seal Primer Device:
1. Standard: ASSE 1018.
2. Pressure Rating: 125 psig minimum.
3. Body: Bronze.
4. Inlet and Outlet Connections: 1/2-inch threaded, union, or solder joint.
5. Gravity Drain Outlet Connection: 1/2-inch threaded or solder joint.
6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

C. Drainage-Type, Trap-Seal Primer Device:
1. Standard: ASSE 1044, lavatory P-trap with 3/8-inch minimum, trap makeup connection.
2. Size: 1-1/4-inch minimum.
3. Material: Chrome-plated, cast brass.

2.13 TRAP-SEAL PRIMER SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. JR Smith.
2. PPP Inc.
3. Watts.
4. Sioux Chief.

B. Trap-Seal Primer Systems:
1. Standard: ASSE 1044.
2. Piping: 3/4-inch, ASTM B 88, Type L; copper, water tubing.
3. Cabinet: Surface or Recessed-mounted steel box with stainless-steel cover.
4. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.

a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

5. Vacuum Breaker: ASSE 1001.
6. Number Outlets**:** Four.
7. Size Outlets: 1/2-inch.

2.14 TRAP-GUARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Sure Seal.
2. ProSet.
3. JR Smith.

B. Trap-Guard Device:
1. Standard: ASSE 1072.
2. Commercial grade UV and Ozone resistant ABS plastic housing with EPDM rubber diaphragm and soft rubber sealing gasket.
3. Size: Refer to Plumbing Drawings.

2.15 SPECIALTY VALVES

A. Comply with requirements for general-duty metal valves in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," Section 220523.14 "Check Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping."

2.16 FLEXIBLE CONNECTORS

A. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig.
2. End Connections 2-inch and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections 2-1/2-inch and Larger: Flanged copper alloy.

B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.

1. Working-Pressure Rating: Minimum 200 psig.
2. End Connections 2-inch and Smaller: Threaded steel-pipe nipple.
3. End Connections 2-1/2-inch and Larger: Flanged steel nipple.

2.17 WATER METERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Neptune.
2. Badger.
3. Zenner.
4. Dwyer.

B. Displacement-Type Water Meters:
1. Description:

a. Standard: AWWA C700.
b. Pressure Rating: 150-psig working pressure.
c. Body Design: Nutating disc; totalization meter.
d. Registration: In gallons or cubic feet as required by utility company.
e. Case: Bronze.
f. End Connections: Threaded.

C. Turbine-Type Water Meters:
1. Description:

a. Standard: AWWA C701.
b. Pressure Rating: 150-psig working pressure.
c. Body Design: Turbine; totalization meter.
d. Registration: In gallons or cubic feet as required by utility company.
e. Case: Bronze.
f. End Connections for Meters 2-inch and Smaller: Threaded.
g. End Connections for Meters 2-1/2-inch and Larger: Flanged.

D. Compound-Type Water Meters:
1. Description:

a. Standard: AWWA C702.
b. Pressure Rating: 150-psig working pressure.
c. Body Design: With integral mainline and bypass meters; totalization meter.
d. Registration: In gallons or cubic feet as required by utility company.
e. Case: Bronze.
f. Pipe Connections: Flanged.

E. Remote Registration System: Direct-reading type complying with AWWA C706; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

F. Remote Registration System: Encoder type complying with AWWA C707; modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
3. Do not install bypass piping around backflow preventers.

B. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

C. Install water-control valves with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified.

F. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve and solenoid valve.

G. Install outlet boxes recessed in wall or surface mounted on wall. Install 2-by-4-inch fire-retardant-treated-wood blocking, wall reinforcement between studs. Comply with requirements for fire-retardant-treated-wood blocking in Section 061000 "Rough Carpentry."

H. Install water-hammer arresters in water piping according to PDI-WH 201.

I. Install air vents at high points of water piping.

J. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

K. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

L. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Pressure vacuum breakers.
2. Intermediate atmospheric-vent backflow preventers.
3. Reduced-pressure-principle backflow preventers.
4. Double-check, backflow-prevention assemblies.
5. Carbonated-beverage-machine backflow preventers.
6. Dual-check-valve backflow preventers.
7. Reduced-pressure-detector, fire-protection, backflow-preventer assemblies.
8. Double-check, detector-assembly backflow preventers.
9. Water pressure-reducing valves.
10. Calibrated balancing valves.
11. Primary, thermostatic, water mixing valves.
12. Primary water tempering valves.
13. Supply-type, trap-seal primer valves.
14. Trap-seal primer systems.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test each pressure vacuum breaker, reduced-pressure-principle backflow preventer, double-check, backflow-prevention assembly and double-check according to authorities having jurisdiction and the device's reference standard.

B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 221119

SECTION 221125 - NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220516	Expansion Fittings and Loops for Plumbing Piping
3.	Section 220517	Sleeves and Sleeve Seals for Plumbing Piping
4.	Section 220518	Escutcheons for Plumbing Piping
5.	Section 220519	Meters and Gauges for Plumbing Piping
6.	Section 220523	General Duty Valves for Plumbing Piping
7.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
8.	Section 220548	Vibration and Seismic Controls for Plumbing Piping and Equipment
9.	Section 220553	Identification for Plumbing Piping and Equipment

1.2 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig minimum unless otherwise indicated.

3. Minimum Operating Pressure of Service Meter: 5 psig.

B. Natural-Gas System Pressure within Buildings: 2.0 psig or less.

C. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.5 SUBMITTALS

A. Product Data: For each type of the following:

1. Piping specialties.
2. Corrugated, stainless-steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Pressure regulators. Indicate pressure ratings and capacities.
5. Service meters. Indicate pressure ratings and capacities. Include bypass fittings
6. Dielectric fittings.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1. Shop Drawing Scale: 1/4 inch per foot.
2. Detail mounting, supports, and valve arrangements for service meter assembly and pressure regulator assembly.

C. Delegated-Design Submittal: For natural-gas piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of seismic restraints.
2. Design Calculations: Calculate requirements for selecting seismic restraints.

1.6 INFORMATION SUBMITTALS

A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

B. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.

C. Qualification Data: For qualified professional engineer.

D. Seismic Qualification Data: Submit certification that vaporizer, air mixer, storage container supports, accessories, and components will withstand seismic forces defined in Section 220548 "Vibration and Seismic Controls for Plumbing Piping." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Welding certificates.

F. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For natural gas equipment and accessories to include in emergency, operation, and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

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.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

D. Protect stored PE pipes and valves from direct sunlight.

1.10 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:

1. Notify the Owner no fewer than three days in advance of proposed interruption of natural-gas service.
2. Do not proceed with interruption of natural-gas service without Owner's written permission.

1.11 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

    a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

6. Mechanical Couplings:
    a. Steel flanges and tube with epoxy finish.
    b. Buna-nitrile seals.
    c. Stainless-steel bolts, washers, and nuts.
    d. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
    e. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.

B. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.

1. Tubing: ASTM A 240/A 240M, corrugated, Series 300 stainless steel.
2. Coating: PE with flame retardant.

    a. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

        1) Flame-Spread Index: 25 or less.
        2) Smoke-Developed Index: 50 or less.

3. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
4. Striker Plates: Steel, designed to protect tubing from penetrations.
5. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
6. Operating-Pressure Rating: 5 psig.

C. Drawn-Temper Copper Tube: Comply with ASTM B 88, Type K.

1. Copper Fittings: ASME B16.22, wrought copper, and streamlined pattern.
2. Bronze Flanges and Flanged Fittings: ASME B16.24, Class 150.

    a. Gasket Material: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    b. Bolts and Nuts: ASME B18.2.1, carbon steel or stainless steel.

3. Protective Coating for Underground Tubing: Factory-applied, extruded PE a minimum of 0.022 inch thick.

D. Annealed-Temper Copper Tube: Comply with ASTM B 88, Type K.

1. Copper Fittings: ASME B16.22, wrought copper, and streamlined pattern.
2. Flare Fittings: Comply with ASME B16.26 and SAE J513.

    a. Copper fittings with long nuts.
    b. Metal-to-metal compression seal without gasket.
    c. Dryseal threads complying with ASME B1.20.3.

3. Protective Coating for Underground Tubing: Factory-applied, extruded PE a minimum of 0.022 inch thick.

2.2 PIPING SPECIALTIES

A. Flexible Piping Joints:

1. Approved for LPG service.
2. Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
3. Minimum working pressure of 250 psig and 250 deg F operating temperature.
4. Flanged- or threaded-end connections to match equipment connected and shall be capable of minimum 3/4-inch misalignment.
5. Maximum 36-inch length for liquid LPG lines.

B. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 72 inches.

C. Quick-Disconnect Devices: Comply with ANSI Z21.41.

1. Copper-alloy convenience outlet and matching plug connector.
2. Nitrile seals.
3. Hand operated with automatic shutoff when disconnected.
4. For indoor or outdoor applications.
5. Adjustable, retractable restraining cable.

D. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for 2-inch and smaller; flanged ends for 2-1/2-inch and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

E. Basket Strainers:

1. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for 2-inch and smaller; flanged ends for 2-1/2-inch and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

F. T-Pattern Strainers:

1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
2. End Connections: Grooved ends.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
4. CWP Rating: 750 psig.

G. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL GAS SHUTOFF VALVES

A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, 2-inch and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1-inch and smaller.
6. Service Mark: Valves 1-1/4-inch to 2-inch shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, 2-1/2-inch and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig.
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.

1. Manufacturers: Provide products by one of the following:

    a. BrassCraft Manufacturing Company; a Masco company.
    b. Conbraco Industries, Inc.; Apollo Div.
    c. Lyall, R. W. & Company, Inc.
    d. McDonald, A. Y. Mfg. Co.
    e. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated brass.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Separate packnut with adjustable-stem packing threaded ends.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves 1-inch and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Provide products by one of the following:

    a. BrassCraft Manufacturing Company; a Masco company.
    b. Conbraco Industries, Inc.; Apollo Div.
    c. Lyall, R. W. & Company, Inc.
    d. McDonald, A. Y. Mfg. Co.
    e. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.

7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves 1-inch and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Provide products by one of the following:

    a. BrassCraft Manufacturing Company; a Masco company.
    b. Conbraco Industries, Inc.; Apollo Div.
    c. Lyall, R. W. & Company, Inc.
    d. McDonald, A. Y. Mfg. Co.
    e. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves 1-inch and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

G. Bronze Plug Valves: MSS SP-78.

1. Manufacturers: Provide products by one of the following:

    a. Lee Brass Company.
    b. McDonald, A. Y. Mfg. Co.
    c. Nibco.

2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig.
7. Listing: Valves 1-inch and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

H. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.

1. Manufacturers: Provide products by one of the following:

    a. McDonald, A. Y. Mfg. Co.
    b. Mueller Co.; Gas Products Div.
    c. Xomox Corporation; a Crane company.
    d. American Production Valve

e. Flowserve.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig.
9. Listing: Valves 1-inch and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

I. Cast-Iron, Lubricated Plug Valves: MSS SP-78.

1. Manufacturers: Provide products by one of the following:

a. Flowserve.
b. Homestead Valve; a division of Olson Technologies, Inc.
c. McDonald, A. Y. Mfg. Co.
d. Milliken Valve Company.
e. Mueller Co.; Gas Products Div.
f. R&M Energy Systems, A Unit of Robbins & Myers, Inc.
g. Superior Valves.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig.
9. Listing: Valves 1-inch and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

J. Valve Boxes:

1. Cast-iron, two-section box.
2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.5 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.

4. End Connections: Threaded for regulators 2-inch and smaller; flanged for regulators 2-1/2-inch and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Provide products by one of the following:

   a. Actaris.
   b. American Meter Company.
   c. Fisher Control Valves and Regulators; Division of Emerson Process Management.
   d. Invensys.
   e. Richards Industries; Jordan Valve Div.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 100 psig.

C. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Provide products by one of the following:

   a. Actaris.
   b. American Meter Company.
   c. Eclipse Combustion, Inc.
   d. Fisher Control Valves and Regulators; Division of Emerson Process Management.
   e. Invensys.
   f. Maxitrol Company.
   g. Richards Industries; Jordan Valve Div.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 2 psig.

D. Appliance Pressure Regulators: Comply with ANSI Z21.18.

1. Manufacturers: Provide products by one of the following:

a. Canadian Meter Company Inc.
b. Eaton Corporation; Controls Div.
c. Harper Wyman Co.
d. Maxitrol Company.
e. SCP, Inc.

2. Body and Diaphragm Case: Die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber.
6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
7. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
9. Maximum Inlet Pressure: 1 psig.

2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Description:

a. Standard: ASSE 1079.
b. Pressure Rating: 125 psig minimum at 180 deg F.
c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Description:

a. Standard: ASSE 1079.
b. Factory-fabricated, bolted, companion-flange assembly.
c. Pressure Rating: 125 psig minimum at 180 deg F.
d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Description:

a. Nonconducting materials for field assembly of companion flanges.
b. Pressure Rating: 150 psig.
c. Gasket: Neoprene or phenolic.
d. Bolt Sleeves: Phenolic or polyethylene.
e. Washers: Phenolic with steel backing washers.

2.7 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

B. Above ground labeling refer to specification section, Identifcation for Plumbing piping and equipment, (220553).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to International Fuel Gas Code, 2015 Edition as amended by The State of New York 2017 Uniform Code to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with International Fuel Gas Code, 2015 Edition as amended by the State of New York 2017 Uniform Code requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

A. Comply with International Fuel Gas Code, 2015 Edition as amended by the State of New York 2017 Uniform Code for installation and purging of natural-gas piping.

B. Install underground, natural-gas piping buried at least 36 inches below finished grade. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.

C. Install underground, PE, natural-gas piping according to ASTM D 2774.

D. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

E. Copper Tubing with Protective Coating:

1. Apply joint cover kits over tubing to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.

F. Install fittings for changes in direction and branch connections.

G. Install pressure gage upstream and downstream from each service regulator. Pressure gages are specified in Section 220519 "Meters and Gages for Plumbing Piping."

3.4 INDOOR PIPING INSTALLATION

A. Comply with International Fuel Gas Code, 2015 Edition as amended by the State of New York 2017 Uniform Code for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Verify final equipment locations for roughing-in.

L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

P. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
2. In Floors: Install natural-gas piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of 1-1/2 inches of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
3. In Floor Channels: Install natural-gas piping in floor channels. Channels must have cover and be open to space above cover for ventilation.
4. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.

    a. Exception: Tubing passing through partitions or walls does not require striker barriers.

5. Prohibited Locations:

    a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
    b. Do not install natural-gas piping in solid walls or partitions.

Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

R. Connect branch piping from top or side of horizontal piping.

S. Install unions in pipes 2-inches and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

T. Do not use natural-gas piping as grounding electrode.

U. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

V. Install pressure gage downstream from each line regulator. Pressure gages are specified in Section 220519 "Meters and Gages for Plumbing Piping."

W. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

X. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

Y. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install earthquake valves aboveground outside buildings according to listing.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

G. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

3.7 HANGER AND SUPPORT INSTALLATION

A. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping."

B. Comply with requirements for pipe hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

C. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. 1-inch and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. 1-1/4-inch: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. 1-1/2 and 2-inch: Maximum span, 108 inches; minimum rod size, 3/8 inch.
4. 2-1/2 to 3-inch: Maximum span, 10 feet; minimum rod size, 1/2 inch.
5. 4-inch and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

D. Install hangers for horizontal drawn-temper copper tubing with the following maximum spacing and minimum rod sizes:

1. 3/8-inch: Maximum span, 48 inches; minimum rod size, 3/8 inch.
2. 1/2 and 5/8-inch: Maximum span, 72 inches; minimum rod size, 3/8 inch.
3. 3/4 and 7/8-inch: Maximum span, 84 inches; minimum rod size, 3/8 inch.
4. 1-inch: Maximum span, 96 inches; minimum rod size, 3/8 inch.

E. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:

1. 3/8 inch: Maximum span, 48 inches; minimum rod size, 3/8 inch.
2. 1/2 inch: Maximum span, 72 inches; minimum rod size, 3/8 inch.
3. 3/4 inch and Larger: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.8 CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Install piping adjacent to appliances to allow service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

A. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for piping and valve identification.

B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 PAINTING

A. Comply with requirements in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for painting interior and exterior natural-gas piping.

B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.

    a. Prime Coat: Alkyd anticorrosive metal primer.
    b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    c. Topcoat: Exterior alkyd enamel flat.
    d. Color: Gray.

C. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Latex Over Alkyd Primer System: MPI INT 5.1Q.

    a. Prime Coat: Alkyd anticorrosive metal primer.
    b. Intermediate Coat: Interior latex matching topcoat.
    c. Topcoat: Interior latex flat.
    d. Color: Gray.

2. Alkyd System: MPI INT 5.1E.

    a. Prime Coat: Alkyd anticorrosive metal primer.
    b. Intermediate Coat: Interior alkyd matching topcoat.
    c. Topcoat: Interior alkyd flat.
    d. Color: Gray.

D. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to International Fuel Gas Code, 2015 Edition as amended by the State of New York 2017 Uniform Code and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.12 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.13 OUTDOOR PIPING SCHEDULE

A. Aboveground natural-gas piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.
3. Annealed-temper copper tube with wrought-copper fittings and brazed joints.

B. Branch Piping in Cast-in-Place Concrete to Single Appliance: Annealed-temper copper tube with wrought-copper fittings and brazed or flared joints. Install piping embedded in concrete with no joints in concrete.

C. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground, branch piping 1-inch and smaller shall be one of the following:

1. Corrugated stainless-steel tubing with mechanical fittings having socket or threaded ends to match adjacent piping.
2. Annealed-temper, tin-lined copper tube with flared joints and fittings.
3. Annealed-temper, copper tube with wrought-copper fittings and brazed or flared joints.
4. Aluminum tube with flared fittings and joints.
5. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.
3. Drawn-temper copper tube with wrought-copper fittings and brazed joints.

C. Underground, below building, piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

D. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

E. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.15 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes 2-inch and smaller at service meter shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.
3. Bronze plug valve.

B. Valves for pipe sizes 2-1/2-inch and larger at service meter shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast-iron, nonlubricated plug valve.

C. Distribution piping valves for pipe sizes 2-inch and smaller shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.

3. Bronze plug valve.

D. Distribution piping valves for pipe sizes 2-1/2-inch and larger shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast-iron, nonlubricated plug valve.

E. Valves in branch piping for single appliance shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.
3. Bronze plug valve.

END OF SECTION 221125

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections:

1.	Section 220100	Plumbing General Requirements
2.	Section 220517	Sleeves and Sleeve Seals for Plumbing Piping
3.	Section 220518	Escutcheons for Plumbing Piping
4.	Section 220529	Hangers and Supports for Plumbing Piping and Equipment
5.	Section 220548	Vibration and Seismic Controls for Plumbing Piping and Equipment
6.	Section 220553	Identification for Plumbing Piping and Equipment
7.	Section 221313	Facility Sanitary Sewers
8.	Section 221319	Sanitary Waste Piping Specialties

1.2 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless, cast-iron soil pipe and fittings.
3. Copper tube and fittings.
4. Specialty pipe fittings.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B16.12 - Cast Iron Threaded Drainage Fittings.
2. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fitting DWV.
3. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
4. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fitting DWV.

B. ASTM International:
1. ASTM A74 - Standard Specification for Cast Iron Pipe.
2. ASTM A888 - Standard Specification for Cast Iron Pipe.
3. ASTM B32 - Standard Specification for Solder Metal.
4. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
5. ASTM B43 - Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
6. ASTM B75 - Standard Specification for Seamless Copper Tube.
7. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
8. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
9. ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes.

C. Cast Iron Soil Pipe Institute: