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PROJECT MANUAL

WHITE PLAINS CITY SCHOOL DISTRICT
5 HOMESIDE LANE
WHITE PLAINS, NEW YORK 10605

RENOVATIONS AT THE ROCHAMBEAU
ALTERNATIVE HIGH SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NEW YORK 10606

SED Control #66-22-00-01-0-015-020

Project No: WPSD2401

CONTRACT G - GENERAL CONSTRUCTION
AND ABATEMENT WORK
CONTRACT M - HEATING VENTILATION
AND AIR CONDITIONING WORK
CONTRACT P - PLUMBING WORK
CONTRACT E - ELECTRICAL WORK

FINAL BID SET
MAY 2025

H2M Architects + Engineers

1133 Westchester Avenue, Suite N-210, White Plains, NY 10605
tel 914.358.5623 fax 914.358.5624

www.h2m.com



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07/31/27
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PAUL D. FOERTH, P.E.

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JOHN CHRIS MORRIS III, P.E.

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The work must be code compliant and conform to all applicable regulations, including the New York State Uniform Fire Prevention and Building Code, The Energy Conservation Construction Code of New York State, the Regulations of the Commissioner of Education, the NYSED Manual of Planning Standards, NYS DOL Code 56, and regulations of all State and Federal agencies with jurisdiction.

WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT THE ROCHAMBEAU ALTERNATIVE HIGH SCHOOL
SED CONTROL NO. 66-22-00-01-0-015-0020
CONTRACT G - GENERAL CONSTRUCTION WORK
CONTRACT W – WINDOW REPLACEMENT
CONTRACT M - HEATING VENTILATION AND AIR CONDITIONING WORK
CONTRACT P - PLUMBING WORK
CONTRACT E - ELECTRICAL WORK

FRONT END DOCUMENTS

00 0110	TABLE OF CONTENTS
00 1113	AMENDED NOTICE TO BIDDERS
00 2113	INSTRUCTIONS FOR BIDDERS
00 2515	QUALIFICATIONS OF BIDDERS
00 4105	BIDDER'S DECLARATION
00 4116	PROPOSAL FORM PA
00 4116.11	PROPOSAL FORM PB-G
00 4116.11	PROPOSAL FORM PB-W
00 4116.11	PROPOSAL FORM PB-M
00 4116.11	PROPOSAL FORM PB-E
00 4116.11	PROPOSAL FORM PB-P
00 4116.19	PROPOSAL FORM PC
00 4357	INSURANCE CERTIFICATION
00 4519	NON-COLLUSIVE FORM
00 4521	HOLD HARMLESS AGREEMENT
00 4547	IRAN DIVESTMENT ACT FORMS
00 4548	SEXUAL HARASSMENT CERTIFICATION
00 4550	SUB-CONTRACTORS LIST
00 5209	SAMPLE AGREEMENT
00 6000	FORM OF DISCLOSURE
00 6000.01	LABOR LAW 220
00 7200	GENERAL CONDITIONS – CM VERSION
00 7200	SPECIAL PROVISIONS
00 7201	NYSED 155.5 REGULATIONS
00 7343	PREVAILING WAGE RATES
00 7344	WEEKLY PAYROLL FORM – WH347

SAMPLE AIA DOCUMENTS

AIA A310	(BID BOND)
AIA A312	(PERFORMANCE BOND)
AIA A312	(PAYMENT BOND)
AIA G702	(APPLICATION AND CERTIFICATE FOR PAYMENT)
AIA G703	(CONTINUATION SHEET)
AIA G704	(CERTIFICATE OF SUBSTANTIAL COMPLETION)
AIA G706	(CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS)
AIA G706A	(CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS)
AIA G707	(CONSENT OF SURETY TO FINAL PAYMENT)

TECHNICAL SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

011100	SUMMARY OF WORK
011400	WORK RESTRICTIONS
011400.11	SED UNIFORM SAFETY STANDARDS
011419	SITE UTILIZATION PLAN
012100	ALLOWANCES
012200	UNIT PRICES
012300	ALTERNATES
012500	PRODUCT SUBSTITUTION PROCEDURES
012900	PAYMENT PROCEDURES
012973	SCHEDULE OF VALUES
013100	PROJECT MANAGEMENT AND COORDINATION
013119	PROGRESS MEETINGS
013216	CONSTRUCTION SCHEDULE
013223	SURVEYING
013300	SUBMITTALS
014100	REGULATORY REQUIREMENTS
014223	SPECIFICATION FORMAT
014320	PRE-INSTALLATION MEETINGS
014500	QUALITY CONTROL
014500.01	STATEMENT OF SPECIAL INSPECTIONS
014536	ENVIRONMENTAL QUALITY CONTROL
015000	TEMPORARY FACILITIES AND CONTROLS
015213	FIELD OFFICES
016100	BASIC PRODUCT REQUIREMENTS
016500	PRODUCT DELIVERY, STORAGE AND HANDLING
017329	CUTTING AND PATCHING
017419	CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
017423	CLEANING
017500	STARTING AND ADJUSTING
017800	CLOSEOUT SUBMITTALS
017823	OPERATING AND MAINTENANCE DATA
017839	PROJECT RECORD DOCUMENTS
017843	SPARE PARTS
017900	DEMONSTRATION AND TRAINING

DIVISION 2 – DEMOLITION

020810	ASBESTOS ABATEMENT
024119	SELECTIVE DEMOLITION

DIVISION 03 - CONCRETE

035400	CEMENTITIOUS UNDERLAYMENT
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DIVISION 04 – MASONRY

047200	CAST STONE MASONRY
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DIVISION 05 – METALS

054000	COLD-FORMED METAL FRAMING
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DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

061000	ROUGH CARPENTRY
062000	FINISH CARPENTRY
064023	INTERIOR SILLS AND TRIM
064116	PLASTIC-LAMINATE-FACED CASEWORK
064600	INTERIOR WOOD TRIM

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

072100	THERMAL INSULATION
075323	ETHYLENE-PROPYLENE-DIENE-MONOMOR (EPDM) ROOFING
078413	PENETRATION FIRESTOPPING
078446	FIRE-RESISTIVE JOINT SYSTEMS
079200	JOINT SEALANTS

DIVISION 08 – OPENINGS

081113	HOLLOW METAL DOORS AND FRAMES
081433	STILE RAIL WOOD DOORS
081623	FIBER REINFORCED PLASTIC DOORS
083113	ACCESS DOORS AND FRAMES
085113	ALUMINUM WINDOWS
086300	METAL FRAMED SKYLIGHTS
087100	DOOR HARDWARE
088000	GLAZING
089100	FIXED LOUVERS

DIVISION 09 – FINISHES

090160	TERRAZO FLOOR RESTORATION
092110	GYPSUM BOARD ASSEMBLIES
092116	GYPSUM BOARD SHAFT WALL ASSEMBLIES
092216	NON-STRUCTURAL METAL FRAMING
093013	CERAMIC TILING - THIN-SET
095113	ACOUSTICAL PANEL CEILINGS
096400	WOOD FLOORING
096413	WOOD FLOORING REFINISHING
096519.23	LUXURY VINYL TILE
097260	TACKABLE WALLCOVERING
099123	INTERIOR PAINTING

DIVISION 10 – SPECIALTIES

101423	SIGNAGE
101500	MEETING ROOM VIDEO DISPLAY SCREENS
102813	TOILET AND MISCELLANEOUS ACCESSORIES

DIVISION 12 – FURNISHINGS

122400	WINDOW SHADES
123216	PLASTIC LAMINATE COUNTERTOPS, SHELVING, AND CASEWORK
123653	LABORATORY WORKSURFACES
125000	FURNITURE

DIVISION 22 – PLUMBING

220523	VALVES FOR PLUMBING SYSTEMS
220529	PIPE HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
220553	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
220576	DRAINAGE ACCESSORIES
220577	FLOOR AND AREA DRAINS
220700	PLUMBING PIPING INSULATION
220800	CLEANING AND TESTING FOR PLUMBING PIPING
221100	PLUMBING PIPING
221119	WATER SUPPLY ACCESSORIES
221120	MIXING VALVES
221122	THERMOMETERS AND GAUGES
224200	PLUMBING FIXTURES

DIVISION 23 – MECHANICAL REQUIREMENTS

230010	GENERAL MECHANICAL REQUIREMENTS
230015	MECHANICAL DEMOLITION
230529	PIPE HANGERS AND SUPPORTS
230555	MECHANICAL SYSTEM IDENTIFICATION
230594.12	BALANCING OF AIR SYSTEMS
230700	PIPE INSULATION
230719	DUCTWORK INSULATION
230800	COMMISSIONING OF MECHANICAL SYSTEMS
230923	AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION SYSTEM
230991	INSTRUMENTATION AND CONTROL INTEGRATION
230993	SEQUENCE OF OPERATIONS
232000	PIPES, VALVES AND FITTINGS
232001	CONDENSATE DRAIN PIPING
232201	STEAM SPECIALITIES
232300	REFRIGERANT PIPING
233113	SHEET METAL WORK
233416	EXHAUST FANS
233701	LOUVERED AIR INLETS AND OUTLETS
233713	DIFFUSERS, REGISTERS AND GRILLES
237213	AIR COOLED CONDENSING UNITS
238126	DUCTLESS SPLIT SYSTEM AIR CONDITIONING
238223	UNIT VENTILATOR
238236	FINNED TUBE RADIATION HEATERS
238239	ELECTRIC HEATERS

DIVISION 26 – ELECTRICAL

260505	ELECTRICAL DEMOLITION
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
260526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533.13	CONDUIT FOR ELECTRICAL SYSTEMS
260533.16	BOXES FOR ELECTRICAL SYSTEMS
260533.23	SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS
260574	ARC FLASH HAZARD ANALYSIS AND SHORT CIRCUIT COORDINATION STUDY
260583	WIRING CONNECTIONS

TABLE OF CONTENTS
WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL



260923	LIGHTING CONTROL DEVICES
262100	LOW VOLTAGE ELECTRICAL SERVICE ENTRANCE
262200	LOW VOLTAGE TRANSFORMERS
262400	PANELBOARDS
262726	WIRING DEVICES
262813	FUSES
262816.16	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
265000	INTERIOR LIGHTING

APPENDIX

FINAL REPORT FOR ENVIRONMENTAL INSPECTION SERVICES – ROCHAMBEAU ALTERNATIVE
HIGH SCHOOL (DATED 07/18/2024)

END OF TABLE OF CONTENTS

AMENDED Notice " Addendum # 1" is hereby given that **SEALED PROPOSALS** for:

WHITE PLAINS CITY SCHOOL DISTRICT

**RENOVATIONS AT THE ROCHAMBEAU ALTERNATIVE HIGH SCHOOL
SED Control No. 66-22-00-01-0-015-0020**

**CONTRACT G - GENERAL CONSTRUCTION AND ABATEMENT WORK
CONTRACT W – WINDOW REPLACEMENT WORK
CONTRACT M - HEATING VENTILATION AND AIR CONDITIONING WORK
CONTRACT P - PLUMBING WORK
CONTRACT E - ELECTRICAL WORK**

Will be received until **1:00pm on Wednesday, June 18th, 2025**, at the White Plains City School District Office main entrance security desk located at 5 Homeside Lane, White Plains, NY 10605. In the event that on this date the White Plains City School District is closed to all students and all staff or has an early dismissal due to weather or any other emergency that closes all schools and offices for all students and all staff prior to 3:00 PM, bids will be due at 11:00 AM on the next day that the school district is open.

Hard copies and electronic bid documents will be available beginning on **Wednesday, May 28th, 2025**.

Complete Digital Sets of Bidding Documents, Plans and Specifications, may be obtained online as a download at the following website: melville.h2mplanroom.com for a nonrefundable fee of **One Hundred Dollars (\$100.00) for each combined set of documents. Plans and Specifications may be obtained from REVplans, 28 Church Street, Unit 7, Warwick, New York 10990, upon deposit of One Hundred Dollars (\$100.00) for each combined set of documents.** Checks or money orders shall be made payable to **White Plains City School District**, checks should be sent directly to REVplans. Bidder's deposit will be refunded if the set is returned to REV in good condition within thirty (30) days following the award of the contract or the rejection of the bids covered by such plans and specifications. **Non-bidders** shall receive partial reimbursement, in an amount equal to the amount of the deposit, less the actual cost of reproduction of the documents if the set is returned in good condition within thirty (30) days following the award of the contract or the rejection of the bids covered by such plans and specifications. Any bidder requiring documents to be shipped shall make arrangements with the printer and pay for all packaging and shipping costs.

Please note REVplans melville.h2mplanroom.com is the designated location and means for distributing and obtaining all bid package information. Only those Contract Documents obtained in this manner will enable a prospective bidder to be identified as an official plan holder of record. The Provider takes no responsibility for the completeness of Contract Documents obtained from other sources. Contract Documents obtained from other sources may not be accurate or may not contain addenda that may have been issued.

All bid addenda will be transmitted to registered plan holders via email and will be available at melville.h2mplanroom.com. Plan holders who have paid for hard copies of the bid documents will need to make the determination if hard copies of the addenda are required for their use and coordinate directly with the printer for hard copies of addenda to be issued. There will be no charge for registered plan holders to obtain hard copies of the bid addenda.

Bids must be made on the standard proposal form in the manner designated therein and as required by the specifications that must be enclosed in sealed opaque envelopes bearing the name of the job and name and address of the bidder on the outside, addressed to: **"PURCHASING AGENT, White Plains City School District"**, clearly marked on the outside, **"Rochambeau Alt. High School Renovations, SED CONTROL NO. 66-22-00-01-0-015-020"**. The School District is not responsible for bids opened prior to the bid opening if bid number and opening date do not appear on the envelope. Bids opened prior to date and time indicated are invalid. The bidder assumes the risk of any delay in the mail, or in the handling of the mail by employees of the White Plains City School District, as well as of improper hand delivery.

Each proposal submitted must be accompanied by a certified check or bid bond, made payable to the "White Plains City School District", in an amount equal to five percent (5 %) of the total amount of the bid, as a commitment by the bidder that, if its bid is accepted, it will enter into a contract to perform the work and will execute such further security as may be required for the faithful performance of the contract.

Certification of bonding company is required for this bid, see Instructions for Bidders.

Each bidder shall agree to hold his/her bid price for forty-five (45) days after the formal bid opening.

A pre-bid meeting and walk thru will be scheduled for 3:30 pm on Wednesday June 4th, 2025, at the Rochambeau Alternative High School, 228 Fisher Avenue, White Plains, New York 10606. Potential bidders are asked to gather outside the front entrance along Fisher Avenue. Potential bidders are asked to contact Robert Firneis, Senior Project Manager, for any pre-bid walk-thru questions:

Primary Contact

Robert Firneis
Senior Project Manager
Triton Construction Company
Field Office- 228 Fisher Ave, White Plains, NY 10606
office (212) 388-5700 | mobile (914) 635-0913
e-mail: rfirneis@tritonconstruction.net

Secondary Contact

Lily Chen
Construction Manager
Triton Construction Company
Field Office- 228 Fisher Ave, White Plains, NY 10606
office (212) 388-5700 office 212.388.5700
mobile (347)346-3294
e-mail: lchen@tritonconstruction.net

Although the pre-bid meeting and walk-thru are **not** mandatory, it is highly recommended that all potential bidders make arrangements to visit the site.

It is the Board's intention to award the contract to the lowest qualified bidder in compliance with the specifications providing the required security who can meet the experience, technical and budget requirements. The Board reserves the right to reject any or all bids, waive any informality and to accept such bid which, in the opinion of the Board, is in the best interests of the School District.

By Order of the Board of Education

**White Plains City School District
5 Homeside Lane White
Plains, NY 10605**

BIDS FOR PROJECT

The Board of Education of the Owner (hereafter called School District), will receive **SEALED PROPOSALS** for:

WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL
WHITE PLAINS
SED: 60-22-00-01-0-015-020
CONTRACT G - GENERAL CONSTRUCTION AND ABATEMENT WORK
CONTRACT W - WINDOW REPLACEMENT WORK
CONTRACT M - HEATING VENTILATION AND AIR CONDITIONING WORK
CONTRACT P - PLUMBING WORK
CONTRACT E - ELECTRICAL WORK

TIME AND PLACE

The sealed proposals are to be submitted at the:

WHITE PLAINS CITY SCHOOL DISTRICT
ADMINISTRATION OFFICE
5 Homeside Lane
White Plains, NY 10605

See notice to bidders for all dates and times.

REQUIRED BID SUBMISSIONS

Each bid submission shall consist of three (3) sealed envelopes containing the following items. The bidder shall carefully remove all forms from the project specification. The project manual should not be submitted or included in the bid package.

Envelope No. 1 - BID PROPOSAL:

This envelope shall be clearly marked with the name of the project, bidders name and marked "**BID PROPOSAL**" in large lettering on the envelope and shall contain the following items:

1. Certified check or Bid Bond in the amount totaling 5% of the base bid.
2. Certified letter from Bonding Company, indicating that they meet the criteria set forth in article 11 of the General Conditions.

3. Certified letter that the company bidding this project has been in business under the same name for a period of five years or longer, and is not currently disbarred from bidding or working on public works projects by the New York State Department of Labor.

4. One (1) fully executed original and one (1) copy (marked "copy") of the following:

- a. Proposal forms (P-sheets).
- b. Non-collusive form.
- c. Hold Harmless Agreement.
- d. Certification of Compliance with the Iran Divestment Act or Declaration of Bidder's Inability to provide Certification of Compliance with the Iran Divestment Act.
- e. Sexual Harassment Certification form.
- f. Insurance Certification.
- g. If the bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof. Each bid must be accompanied by the Insurance Certification Form located in the specifications Failure to provide may result in the School District finding the bidder "non-responsive" to the bid documents.
- h. Department of Labor Certification Form

Envelope No. 2 - BID QUALIFICATIONS:

This envelope shall be clearly marked with the name of the project, bidders name and marked "**BID QUALIFICATIONS**" in large lettering on the envelope and shall contain the following items:

1. A description of its experience with projects of comparative size, complexity and cost together with documentary evidence showing that said projects were completed to the School District's satisfaction and were completed in a timely fashion.

2. Documentation from five projects completed within the past five years:

- a. timeliness of performance of the work of the project.
- b. evidence that the project was completed to the School District's satisfaction.
- c. whether any extensions of time were requested and if such requests were granted.
- d. whether litigation and/or arbitration was commenced by either the School District or the bidder as a result of the work of the project completed by the bidder.
- e. whether any liens were filed on the project by subcontractors or material suppliers of the bidder.
- f. whether the bidder was defaulted on the project by the School District.
- g. whether the bidder made any claims for extra work on the project, including whether said claim resulted in a change order.

3. Documentation evidencing the bidder's financial responsibility, including a certified financial statement prepared by a Certified Public Accountant.
4. Fully completed statement of bidder's qualification.
5. Fully completed list of subcontractors.

Envelope No. 3 SUB-CONTRACTOR BID QUALIFICATIONS:

Each contract shall submit with their bid, a third and separate sealed envelope containing the list of names of the subcontractors that the bidder will use to perform work and the agreed upon amounts to be paid for each of the following as applicable to the project.

After the low bid for each contract is announced, the sealed list of subcontractors submitted by the apparent low bidder shall be opened and the names of the subcontractors announced.

DETERMINATION OF BIDDERS

In the consideration and acceptance of any proposal, the School District shall be entitled to exercise every measure of lawful discretion in evaluating the financial history and ability of the Bidder and its past performance in ventures of this or similar nature. Such data will be considered either as a material or controlling factor in the acceptance of any bid submitted.

1. Bidders must prove to the satisfaction of the School District that they are reputable, reliable and responsible.
2. The School District may make any investigation it deems necessary to assure itself of the ability of the Bidder to perform the work.
3. The School District reserves the right to reject any or all proposals and to accept the proposal it deems in the best interest of the School District.
4. A tie-bid is defined as an instance where bids are received from two or more Bidders who are the low responsive Bidders, and their offers are identical. It is the policy of the District to settle the outcome of tie-bids by either drawing a name from a hat or flipping a coin within 24 hours of the bid opening. All affected firms will be notified of the tie, the time and place of the resolution of the tie and shall be invited to witness the outcome. Attendance is not mandatory. The drawing/flip will be held at the District Administration Office. Two impartial witnesses will be provided and shall be present. All attendees will acknowledge the results of the tie-breaker on the bid tabulation sheet. All firms affected by the bids will be notified of the results. The results pursuant to this provision shall be considered final.

DEPOSITS

Bidders deposit will be refunded if the set is returned in good condition within thirty (30) days following the award of the contract or the rejection of the bids covered by such plans and specifications. Non-bidders shall receive partial reimbursement, in an amount equal to the amount of the deposit, less the actual cost of reproduction of the documents if the set is returned in good condition within thirty (30) days following the award of the contract or the rejection of the bids covered by such plans and specifications.

VERBAL ANSWERS

The School District, its agents, servants, employees and the Architect/Engineer shall not be responsible in any manner for **verbal** answers to inquiries made regarding the meaning of the contract documents, drawings or the specifications prior to the awarding of the contract.

For information with reference to the work and its location during bid phase by prospective bidders' questions shall be submitted in writing to:

Joseph C. Ciserano
Senior Associate | Assistant Studio Director
H2M Architects + Engineers
538 Broad Hollow Road, Suite 4E
Melville, New York 11747
Phone: 631-756-8000 1337
Fax: (631) 894-4122
E-mail: jciserano@h2m.com

To be given consideration, questions must be received in writing at least ten (10) days prior to the date fixed for the opening of bids.

ADDENDA AND INTERPRETATIONS

No interpretations of the meaning of the plans, specifications or other Contract Documents will be made to any bidder orally. Every request for such interpretation shall be made in writing, addressed to:

Joseph C. Ciserano
Senior Associate | Assistant Studio Director
H2M Architects + Engineers
538 Broad Hollow Road, Suite 4E
Melville, New York 11747
Phone: 631-756-8000 1337
Fax: (631) 894-4122
E-mail: jciserano@h2m.com

To be given consideration, questions must be received in writing at least ten (10) days prior to the date fixed for the opening of bids. Any and all interpretations and any supplement instructions will be in the form of written addenda to the specifications, and will be sent by mail or faxed to each of the Contractors who has taken out the Drawings and Contract Documents.

All addenda so issued shall become part of the Contract Documents. If any addenda may materially affect the bid, as solely determined by the School District, the School District may extend the bid date.

PRE-BID INSPECTION OF SITE

Each bidder shall conduct on-site inspections of the referenced project site during the pre-bid walkthrough prior to submission of a bid proposal. The bidder shall acquaint himself/herself with all apparent conditions and characteristics of the facility with regard to assessment of required materials quantities, evaluation of quality of existing materials, access to the site and equipment, location of underground utilities, clearances and all related information necessary to develop an understanding of the required scope of the work and all field conditions. Bidders must satisfy themselves by personal examination of the location of the proposed work and of the actual conditions and requirements of the work and shall not, at any time after the submission of the Proposal, dispute or complain of such estimate or assert there was any misunderstanding in regard to the depth or character or the nature of the work to be done. No consideration will be given for subsequent additional claims by the successful bidder after bidding with regard to apparent field conditions.

PRE-BID CONFERENCE

See Section "Notice to Bidders"

BIDDER TO BE FAMILIAR WITH PLANS AND REQUIREMENTS

It is the bidder's responsibility to examine carefully the plans and specifications, proposal and the site upon which the work is to be performed. A proposal submitted shall be prima facie evidence that the bidder has made such examination and that he/she is familiar with all of the conditions and requirements.

PREPARATION OF PROPOSAL

The Proposal forms for project contained herein must be used in preparing bids. Failure to use said Proposal forms or the inclusion of bids not requested shall result in rejection of the bid.

No proposal shall be considered by the School District unless the bidder tendering same demonstrates that it is skilled in work of a similar nature to that envisaged in the Contract/Bidding Documents.

Each bidder shall fill out in ink (in both words and figures) and signed by an officer of the corporation in the spaces provided, its unit or lump sum bid, as the case may be, for each item in the Proposal. If there is a discrepancy between the prices in words and figures, the prices in words shall govern as unit and lump sum prices.

No bid will be considered which does not include bids for all items listed in the proposal sheets.

NAME OF BIDDER

Each bidder must state in the Proposal its full name and business address, and the full name of every person, firm or corporation interested therein and the address of every person or firm, or president and secretary of every corporation interested with it; if no other person, firm or corporation be so interested, it must affirmatively state such fact. The Bidder must also state that the Proposal is made without any connection (directly or indirectly) with any other bidder for the work mentioned in its proposal and is (in all respects) without fraud or collusion; it has inspected the site of the work, has examined the Contract, General Conditions, Specifications, Plans, all addenda, and Information for Bidders; no person acting for or employed by the school district is directly or indirectly interested therein, or in the supplies or work to which it relates or in any portion of the prospective profits thereof; it proposes and agrees if its proposal or

bid is accepted, to execute a contract with the school district to perform the work mentioned in the contract, plans and specifications attached; for the amount stated in the bid proposal.

CERTIFIED CHECK OR BID BOND/BONDING CERTIFICATION

Each bid must be accompanied by either a certified check drawn on a solvent bank with an office in the State of New York, or a bid bond equal to ten percent (10 %) of the total amount of the project bid, and payable to the "WHITE PLAINS CITY SCHOOL DISTRICT ". This amount shall be the measure of liquidated damages sustained by the School District as a result of the failure, negligence or refusal of the Bidder to whom the contract is awarded to execute and deliver the contract. Provide a certified statement that the bonding company meets or exceeds the requirements set forth in Article 11 of the General Conditions.

A Performance and Payment bond will be required for the work. Each shall be in the amount of 100% of the contract sum. Refer to Article 11 of the General Conditions for requirements associated with such bonds.

PERMITS AND REGULATIONS

Each Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. Each Contractor is required to observe all laws and ordinances including, but not limited to, relating to the obstructing of streets, maintaining signals, keeping open passageways and protecting them where exposed to danger, and all general ordinances affecting him, his employees, or his work hereunder in his relations to the School District or any person. Each contractor shall also obey all laws and ordinances controlling or limiting the Contractor while engaged in the prosecution of the work under this Contract.

If the Contractor observes that the drawings and specifications are at variance with laws and regulations, he/she shall promptly notify the Architect in writing and any necessary changes shall be adjusted as provided in the contract for changes in the work. If the Contractor performs any work knowing it be contrary to such laws, ordinances, rules, regulations, or specifications, or local, state or federal authorities without such notice to the Architect, he/she bear all costs arising therefrom.

CONTRACTOR'S UNDERSTANDING

It is understood and agreed that the bidder has, by careful examination, satisfied himself/herself as to the nature and location of the Work, and confirmation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under the contract intended to be awarded.

No official, officer or agent of the School District is authorized to make any representations as to the materials or workmanship involved or the conditions to be encountered and the bidder agrees that no such statement or the evidence of any documents or plans, not a part of the contract to be awarded, shall constitute any grounds for claim as to conditions encountered. No verbal agreement or conversation with any officer, agent or employee of the School District either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.

It is understood and agreed that the bidder has informed himself fully as to the conditions relating to construction and labor under which the work will be performed and agrees as far as possible to employ such methods and means in the performance of his work so as not to cause interruption or interference with the School District's operations or any other contractor performing work at the project site.

EQUIVALENTS

A. In the Specifications, one or more kinds, types, brands, or manufacturers or materials listed are regarded as the required standard of quality and are presumed to be equal. The bidder may select one of these items or, if the bidder desires to use any kind type, brand, or manufacturer or material other than those named in the specifications, they shall indicate in writing when requested, and prior to award of contract, what kind, type, brand or manufacturer is included in the base bid for the specified item.

B. Submission for equivalents shall be submitted to the Architect prior to the award of the contract.

C. Refer to Article 6(W) of the General Conditions for submission requirements. Bidder shall provide the Architect with the same documentation as required for substituted materials as set forth in Article 6(X) of the General Conditions.

BID EVALUATION

The School District and the Architect may make such investigation as they deem necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish the School District with all such additional information and data for this purpose as may be requested. The School District reserves the right to reject any bid if the evidence submitted by, or investigation of such bidder fails to satisfy the School District that such bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

BID WITHDRAWAL

No bids may be withdrawn for a period of 45 days after opening of bids. The School District may request an extension in writing, if necessary, for bidders to hold their bid for an additional 45 days.

SCHOOL DISTRICT RESERVATION OF RIGHTS

The School District reserves the right to waive what it deems to be informalities relating to a specific bid, to waive what it deems to be technical defects, irregularities and omissions relating to a specific bid, to reject any or all bids, to request additional information from any bidder or to re-advertise and invite new bids.

CONTRACTOR'S QUALIFICATION STATEMENT (POST BID)

The apparent low bidder must submit the required pre-award submittal package described below to the School District's Construction Representative within 48 hours after the bids are opened.

Triton Construction Co., Inc.

Attn: Robert Firneis

550 7th Ave - 14th Floor

New York, NY 10018

Phone: (212) 388-5700

Email: rfirneis@tritonconstruction.net

Submissions must be emailed and must include the Project Name of this contract in the Subject Line of the Pre-Award submission email.

1. Pre-award Submittal Package

- a. Fully execute AIA-A305 Contractors Qualification Statement.
- b. Most recent financial statement by CPA.
- c. References and experience:
 - (1) List of all past contracts with K-12 Public School Districts.
 - (2) Provide three (3) references (Name, Title, Phone Number and email) of persons associated with three (3) different projects (public or private sector) of similar scope and size to the one identified in this contract. Additionally, include the names of two major suppliers used for each of these three (3) projects.

2. Workforce and Work Plan - Provide a detailed written Work Plan which shall / demonstrate the contractor's understanding of overall project scope and shall include, but not be limited, to the following:

- a. Sequential listing of specific project activities required to successfully complete the Work of the Contract.
 - (1) Include Schedule and list Critical Milestones.
 - (2) Include Phasing of the work, if required.
 - (3) Include listing of long lead-time items.
 - (4) Impact of weather and restricted work periods.
 - (5) Signed statement from a company officer that the Project can be completed in the established construction duration listed in the contract documents.
- b. Resumes for the contractor's proposed project site supervisor and staff including qualifications for specialized expertise or any certifications required to perform the Work.
- c. Names of proposed major sub-contractors (more than 15% of the bid amount) and a listing of the related trade work and value.
- d. Any special coordination requirements with other trades or ongoing contracts under separate contract(s).
- e. Any special storage and/ or staging requirements for construction materials required for the work.
- f. Any other special requirements including those noted in the contract documents or known to the contractor / subcontractor(s).

3. Detailed Cost Estimate:

- a. A copy of Detailed Cost Estimate outlined in CSI format for the contract work.

NOTICE OF ACCEPTANCE

The School District shall give notice of acceptance of a bid by either registered or certified mail, sent within forty five (45) days after the bids have been opened unless the time to award has been extended.

SIGNING OF CONTRACT

Each Bidder to whom a contract is awarded, shall, at the office of the School District within ten (10) business days after the date of notification by either registered or certified mail of acceptance of its proposal furnish the required payment and performance bonds in an amount of 100% of the contract, and the required insurance as set forth in Article 10 of the General Conditions, and sign the contract for the work for its performance and maintenance.

INSURANCE

The amounts, types and clauses to be included in the insurance is required to be carried by the successful bidder and its contractors, are listed as set forth in Article 10 of the General Conditions.

WAIVER OF IMMUNITY

Attention is directed to the statement of non-collusion required by Article 5A of the "General Municipal Law of the State of New York" concerning Waiver of Immunity and included in the attached Agreement.

RESPONSIBILITY OF BIDDER

The attention of Bidders is directed particularly to the contract provisions whereby the Contractor will be responsible for any loss or damage that may occur to the work or any part thereof during its progress and whereby the Contractor must make good any defects or faults in the work that may occur during the progress or within two (2) years after its acceptance.

Each Contractor shall provide for the continuation of the Performance Bond as a Maintenance Bond for two (2) full years after date of final payment request at the full contract price.

The work is to be performed and completed to the satisfaction of the School District & Architect/Engineer and in accordance with the specifications annexed hereto and the plans referred to therein.

LABOR RATES

Each Bidder awarded a contract shall pay not less than the minimum hourly wage rates on those contracts as established in accordance with Section 220 of the Labor Law as shown in the schedule.

Article 8, Section 220 of the Labor Law, as amended by Chapter 750 of the Laws of 1956, provides (among other things) that it shall be the duty of the fiscal officer to make a determination of the schedule of wages to be paid to all laborers, workers and mechanics employed on public work projects, including supplements for welfare, pension, vacation and other benefits. These supplements include hospital, surgical or medical insurance, or benefits; life insurance or death benefits; accidental death or dismemberment insurance; and pension or retirement benefits. If the amount of supplements provided by the employer is less than the total supplements shown on the wage schedule, the difference shall be paid in cash to the employee.

Article 8, Section 220 of the Labor Law, as amended by Chapter 750 of the Laws of 1956, also provides that the supplements to be provided to laborers, workers and mechanics upon public work, "...shall be in accordance with the prevailing practices in the locality..." The amount for supplements listed on the enclosed schedule does not necessarily include all types of prevailing supplements in the locality, and a future determination of the Industrial Commissioner may require the Contractor to provide additional supplements.

The original payrolls or transcripts shall be preserved for three (3) years from the completion of the work on the awarded project by the Bidders awarded a contract. The School District shall receive such payroll record upon completion of project.

WHITE PLAINS CITY SCHOOL DISTRICT
Board of Education
5 Homeside Lane
White Plains, NY 10605

QUALIFICATIONS OF BIDDERS

Experience and Qualifications of the Bidder: Each bidder is required to submit the following documentation to demonstrate its experience and qualifications for the work of the Project for which a bid is submitted as well as the following Statement of Bidder's Qualifications.:

- a. A description of its experience with projects of comparative size, complexity, and cost, together with documentary evidence showing that said projects were completed to the Owner's satisfaction and were completed in a timely fashion;
- b. Documentation from each of the projects it has performed capital work in the last five (5) years concerning the bidder's:
 - (i) timeliness of performance of the work of the project
 - (ii) evidence that the project was completed to the Owner's satisfaction;
 - (ii) whether or not any extensions of time were requested by the contractor and whether or not such requests were granted;
 - (iv) whether litigation and/or arbitration was commenced by either the Owner or the bidder as a result of the work of the project performed by the bidder;
 - (v) whether any liens were filed on the project by subcontractors or material suppliers of the bidder;
 - (vi) whether the bidder was defaulted on the project by the owner;
 - (vii) whether the bidder made any claims for extra work on the project, including whether said claim resulted in a change order;
- c. Documentation evidencing the bidder's financial responsibility, including a certified financial statement prepared by a certified public accountant.
- d. Documentation evidencing the bidder's existence under the same name for the last five (5) years.
- e. Documentation evidencing the bidder's Worker's Compensation Experience Modification.

STATEMENT OF BIDDER'S QUALIFICATIONS

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE ANSWER TO ALL OF THE QUESTIONS IN THIS STATEMENT. IF ADDITIONAL SPACE IS REQUIRED TO FURNISH A COMPLETE ANSWER, BIDDER MAY ATTACH PAGES AS NECESSARY. IN THE EVENT THAT COMPLETE ANSWERS ARE NOT PROVIDED TO EVERY QUESTION, THE BID WILL BE REJECTED.

1. Name of Bidder

2. Type of Business Entity (e.g., sole proprietor, partnership, corporation, LLC, etc.)

3. If the bidder is a corporation, state the date and place of incorporation of the corporation.

4. For how many years has the bidder done business under its present name?

5. List the persons who are directors, officers owners, managerial employees or partners in the bidder's business.

6. Have any of the persons listed in Number 5 owned/operated/been shareholders in any other companies? If so, please state name of the other companies and the individuals who owned, operated, or have been shareholders:

7. Has any director, officer, owner or managerial employee had any professional license suspended or revoked? If the answer to this question is yes, list the name of the individual, the professional license he/she formerly held, whether said license was revoked or suspended and the date of the revocation or suspension.

8. Has the bidder been found guilty of any OSHA Violations? If the answer to this question is yes, describe the nature of the OSHA violation, an explanation of remediation or other steps taken regarding such violation(s).

9. Has the bidder been charged with any claims pertaining to unlawful intimidation or discrimination against any employee by reason of race, creed, color, disability, sex or natural origin and/or violations of an employee's civil rights or equal employment opportunities? If the answer to this question is yes, list the persons making such claim against the bidder, a description of the claim, the status of the claim, and what disposition (if any) has been made regarding such claim.

10. Has the bidder been named as a party in any lawsuit arising from performance of work related to any project in which it has been engaged? If the answer to this question is yes, list all such lawsuits, the index number associated with said suit and the status of the lawsuit at the time of the submission of this bid.

11. Has the bidder been the subject of an investigation and/or proceedings before the Department of Labor for alleged violations of the Labor Law as it relates to the payment of prevailing wages and/or supplemental payment requirements? If the answer to this question is yes, please list each such instance of the commencement of a Department of Labor proceeding, for which project such proceeding was commenced, and the status of the proceeding at the time of the submission of this bid.

12. Has the bidder been the subject of an investigation and/or proceeding before any law enforcement agency, including, but not limited to any District Attorney's Office? If the answer to this question is yes, please list each such instance, the law enforcement agency, the nature of the proceeding, the project for which such proceeding was commenced, if applicable to a project, and the status of the proceeding at the time of the submission of this bid.

13. Has the bidder been the subject of proceedings involving allegations that it violated the Workers' Compensation Law, including but not limited to, the failure to provide proof of worker's compensation or disability coverage and/or any lapses thereof? If the answer to this question is yes, list each such instance of violation and the status of the claimed violation at the time of the submissions of this bid.

14. Has the bidder, its officers, directors, owner and/or managerial employees been convicted of a crime or been the subject of a criminal indictment? If the answer to this question is yes, list the name of the individual convicted or indicted, the charge against the individual and the date of disposition of the charge.

15. Has the bidder been charged with and/or found guilty of any violations of federal, state, or municipal environmental and/or health laws, codes, rules and/or regulations? If the answer to this question is yes, list the nature of the charge against the bidder, the date of the charge, and the status of the charge at the time of the submission of this bid.

16. Has the bidder bid on any projects for the period June 1, 2020 to present? If the answer to this question is yes, list the projects bid on, whether said bid was awarded to the bidder and the expected date of commencement of the work for said project. For those projects listed, if the bidder was not awarded the contract, state whether the bidder was the lowest monetary bidder.

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST OF PROJECTS AS REQUIRED BY THIS QUESTION #16 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID, THE BID WILL BE REJECTED

17. Does the bidder have any projects ongoing at the time of the submission of this bid? If the answer to this question is yes, list the projects on which the bidder is currently working, the percentage complete, and the expected date of completion of said project.

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST OF PROJECTS AS REQUIRED BY THIS QUESTION #17 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID, THE BID WILL BE REJECTED.

18. Have the bidder and its bond surety ever been notified by a project Owner that the Owner is contemplating declaring a default and requested a conference to discuss the performance of the contract? If the answer to this question is yes, list the projects on which such a conference was held, and the result of the conference, and the status of the project in question.

19. Has the bidder ever been terminated from a Project by the Owner? If the answer to this question is yes, list the projects on which the bidder was terminated, the nature of the termination (convenience, suspension, for cause), and the date of said termination.

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST OF PROJECTS AS REQUIRED BY THIS QUESTION #19 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID, THE BID WILL BE REJECTED.

20. Has the bidder's surety ever been contacted to provide supervisory services in connection with an on-going project. If the answer to this question is yes, list the project(s) for which the surety provided supervisory services.

IMPORTANT: BIDDERS ARE REQUIRED TO FURNISH A COMPLETE LIST OF PROJECTS AS REQUIRED BY THIS QUESTION #20 WITH ITS BID. IN THE EVENT THE LIST REQUESTED IS NOT SUBMITTED WITH THE BIDDER'S BID, THE BID WILL BE REJECTED.

21. Bidder's Worker's Compensation Experience Modifier: _____

Dated:

By: _____
(Signature)

(Print Name and Title)

Sworn to before me this

_____ day of _____, 20_____

Notary Public

BIDDER'S DECLARATION:

The undersigned, as Bidder, declares that the only person or persons interested in this bid or proposal as principal or principals is or are named herein; and that no other person than herein named has any interest in this proposal or in the contract proposed to be taken; that this bid or proposal is made without any connections with any other person or persons making a bid or proposal for the same purpose; that the bid or proposal is in all respects fair and without collusion or fraud; that it has examined the site of the work and the Contract Documents; and fully understands all the same; and it proposes and agrees, if this proposal is accepted, it will contract with the WHITE PLAINS CITY SCHOOL DISTRICT in the Contract accompanying this bid to furnish all the material, implements, etc., and perform all the work required in accordance with the Contract Documents; and it will accept in full payment therefore the following sums to wit:

Acknowledgement that the foregoing Bidder's Declaration is true and factual.

SIGNATURE	PRINT NAME	TITLE	DATE
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END OF SECTION

PROPOSAL (PA)
WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL

CONTRACT G - GENERAL CONSTRUCTION AND ABATEMENT WORK
CONTRACT W - WINDOW REPLACEMENT WORK
CONTRACT M - HEATING VENTILATION AND AIR CONDITIONING WORK
CONTRACT P - PLUMBING WORK
CONTRACT E - ELECTRICAL WORK

To: **WHITE PLAINS CITY SCHOOL DISTRICT**
5 Homeside Lane
White Plains, NY 10605

For the furnishing and installing of materials for all work included under contract as follows:

Made this May day of 28, 2025

Bidders Declaration:

The party named as Bidder declares that the only person or persons interested in this bid or proposal as principal or principals is or are named herein; and that no other person than herein named has any interest in this proposal or in the contract proposed to be taken; that this bid or proposal is made without any connections with any other person and persons making a bid or proposal for the same purpose; that the bid or proposal is in all respects fair and without collusion or fraud; that it has examined the site of the work, the contract and specifications and the drawings referred to; and has read the Information for Bidders hereto attached; and it proposes and agrees, if this proposal is accepted, it will contract in the form as approved to perform all the work mentioned in said contract and specifications; and it will accept in full payment therefore the following sums to wit:

END OF SECTION

Note: The bidder is asked to use either black ink or typewriter (black ribbon) in completing this proposal form. Each line item amount must be completed. Failure to do so will be grounds for disqualification of the bidder.

BASE BID: Contract G – General Construction and Abatement Work

ITEM 1 – BONDS and INSURANCES

(written in words) _____ (\$)

ITEM 2 – MOBILIZATION

(written in words) _____ (\$)

ITEM 3 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words) _____ (\$)

ITEM 4 – DIVISION 1 – PROJECT SUPERVISION

(written in words) _____ (\$)

ITEM 5 – DIVISION 2 – ABATEMENT WORK

(written in words) _____ (\$)

ITEM 6 – DIVISION 2 – DEMOLITION WORK

(written in words) _____ (\$)

ITEM 7 – DIVISION 3 – CONCRETE

(written in words) _____ (\$)

ITEM 8 – DIVISION 5 – METALS

(written in words) _____ (\$)

ITEM 9 – DIVISION 6 – WOOD, PLASTICS AND COMPOSITES

(written in words) _____ (\$)

ITEM 10 – DIVISION 7 – THERMAL AND MOISTURE PROTECTION

(written in words) _____ (\$)

ITEM 11 – DIVISION 8 - OPENINGS

(written in words) _____ (\$)

ITEM 12 – DIVISION 9 - FINISHES

(written in words) _____ (\$)

ITEM 13 – DIVISION 10 – SPECIALTIES

(written in words) _____ (\$)

ITEM 14 – DIVISION 12 – FURNISHINGS

(written in words) _____ (\$)

ITEM 15 – AS-BUILT DRAWINGS

(written in words) _____ (\$)

ITEM 16 – PROJECT CLOSEOUT

(written in words) _____ (\$)

ALLOWANCE G1 – ALLOWANCE FOR GENERAL CONTINGENCY

(written in words) Seventy Five Thousand Dollars and 00 Cents (\$ 75,000.00)

TOTAL BASE BID (ITEMS 1 – 15 INCLUSIVE, PLUS ALLOWANCES G1)

(written in words) _____ (\$)

ALTERNATES

The contractor shall clearly state whether cost indicated is to be added to or deducted from the base bid cost. Failure to clearly state same will be grounds for disqualification of the bidder. All work included under this heading shall be subject to the general conditions of the project. All construction, workmanship and finishes required by the alternates shall be as specified in the applicable sections of the specifications manual.

The undersigned proposes and agrees that should the following alternates be accepted and included in the contract, the amount of the TOTAL BASE BID will be revised as follows. The undersigned further agrees that should the following Alternates be accepted at a subsequent date, after the base bid contract is awarded, due to additional funds provided to the school district through a Smart Schools Bond Act, the alternate bid prices indicated shall be held and honored for a period of one year from the date of contract signing.

NUMBER	DESCRIPTION	COST
ALT-G1 (Deduct)	Remove from the scope of work all labor and materials related to any door replacements between the classrooms and corridors	(\$)
ALT-G2 (Add)	Provide all labor and materials associated with the removal and replacements of the skylights above the gymnasium.	(\$)
ALT-G3 (Deduct)	Remove from the scope of work all labor and materials related to the removal of the skylight above the auditorium stage and associated construction with in-filling the opening.	(\$)

Note: The WHITE PLAINS CITY SCHOOL DISTRICT is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

EACH BIDDER SHALL SUBMIT WITH IT'S BID A SEPARATE SEALED LIST THAT NAMES THE SUBCONTRACTORS THAT THE BIDDER WILL USE TO PERFORM WORK AND THE AGREED UPON AMOUNT TO BE PAID FOR A.) HEATING, VENTILATION AND AIR-CONDITIONING WORK, B.) PLUMBING WORK AND C.) ELECTRICAL WORK. AFTER THE LOW BID IS ANNOUNCED, THE SEALED LIST OF SUBCONTRACTORS SUBMITTED BY THE APPARENT LOW BIDDER SHALL BE OPENED AND THE NAMES OF THE SUBCONTRACTORS ANNOUNCED. ANY CHANGE OF SUBCONTRACTOR OR AGREED UPON AMOUNT TO BE PAID SHALL REQUIRE THE APPROVAL OF THE PUBLIC OWNER, UPON A SHOWING OF "LEGITIMATE CONSTRUCTION NEED" FOR SUCH CHANGE.

"LEGITIMATE CONSTRUCTION NEED" SHALL INCLUDE, BUT NOT BE LIMITED TO:

A CHANGE IN PROJECT SPECIFICATIONS,
A CHANGE IN CONSTRUCTION MATERIAL COSTS,
A CHANGE IN SUBCONTRACTOR STATUS, OR
THE SUBCONTRACTOR HAS BECOME UNWILLING, UNABLE OR UNAVAILABLE TO PERFORM THE SUBCONTRACT.

THE SEALED LISTS OF SUBCONTRACTORS SUBMITTED BY ALL OTHER BIDDERS SHALL BE RETURNED TO THEM UNOPENED AFTER THE CONTRACT AWARD.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS AS OPPOSED TO 15 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY WITHIN 7 CALENDAR DAYS WILL RESULT IN INTEREST DUE FOR ALL CALENDAR DAYS SUBSEQUENT TO THE SEVENTH DAY THROUGH THE DATE THAT PAYMENT IS MADE.

THE BIDDER UNDERSTANDS THAT THE OWNER RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS AND TO WAIVE ANY INFORMALITIES IN THE BIDDING.

THE BIDDER AGREES THAT THE BID SHALL BE GOOD AND MAY NOT BE WITHDRAWN FOR A PERIOD OF **FORTY-FIVE (45)** CALENDAR DAYS AFTER THE SCHEDULED CLOSING TIME FOR RECEIVING BIDS.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLE 6(W) OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR HIS OR HER STAFF, SUBCONTRACTORS AND SUPPLIERS FOR THE DURATION OF THIS PROJECT. A COMPETENT SUPERINTENDENT SHALL BE IN ATTENDANCE AT THE JOB SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED UNDER THEIR CONTRACT. THE SUPERINTENDENT IS RESPONSIBLE TO VISIT THE JOB SITE DAILY WHEN WORK IS NOT BEING PERFORMED UNDER THEIR CONTRACT AND TO MONITOR THE OVERALL CONSTRUCTION PROGRESS. A QUALIFIED SITE SUPERINTENDENT MUST HAVE THE AUTHORITY TO REPRESENT AND MAKE DECISIONS FOR HIS OR HER COMPANY WITH REGARDS TO THE SUBJECT JOB, MUST BE ABLE TO GIVE GUIDANCE AND DIRECTION TO EMPLOYEES, SUBCONTRACTORS AND SUPPLIERS, AND MUST BE KNOWLEDGEABLE ABOUT THE WORK TO BE PROVIDED. FAILURE TO PROVIDE A QUALIFIED

SITE SUPERINTENDENT AT THE JOB SITE SHALL SUBJECT SAID PRIME CONTRACTOR TO A PENALTY OF \$1,000 PER DAY FOR EVERY OCCURRENCE.

TIME OF COMPLETION

ALL WORK UNDER THIS CONTRACT SHALL BE COMPLETED BETWEEN THE FOLLOWING HOURS, IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS:	Monday – Saturday
WORK HOURS:	7:00 AM - 8:00 PM
CONSTRUCTION START DATE:	TBD, 2024
SUBSTANTIAL COMPLETION:	TBD, 2024
FINAL COMPLETION:	TBD, 2024

IF NECESSARY, WEEKEND, HOLIDAY AND EVENING WORK SHALL BE PROVIDED TO ENSURE THE COMPLETION DATES LISTED ABOVE, AT THE SOLE COST AND EXPENSE OF THE BIDDER.

FAILURE OF THE CONTRACTOR TO COMPLETE WORK BY THE SPECIFIED TIME SHALL SUBJECT HIM/HER TO LIQUIDATED DAMAGES AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS.

THE ARCHITECT/ENGINEER SHALL ACT AS THE RECORD KEEPER OF CONTRACT DAYS; HE WILL BE THE SOLE JUDGE OF DELAYS CAUSED BY WEATHER. ONLY WEATHER DELAYS, AS ADJUDGED BY THE ARCHITECT/ENGINEER, WILL BE CONSIDERED FOR EXTENSIONS OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL SUBMIT A BI-WEEKLY REQUEST FOR DELAYS DUE TO WEATHER TO THE ARCHITECT/ENGINEER FOR APPROVAL. NO OTHER DELAY CLAIMS WILL BE ACCEPTED, FOR CREDIT TOWARDS THE PROJECT COMPLETION SCHEDULE, REGARDLESS OF THE SOURCE OF THE DELAY.

FAILURE OF THE CONTRACTOR TO COMPLETE ALL WORK SHOWN AND SPECIFIED IN THE CONTRACT DOCUMENTS, BY ALL OF THE SPECIFIED TIME FRAMES, SHALL SUBJECT THE CONTRACTOR TO LIQUIDATED DAMAGES, AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, IN THE SUM OF ONE THOUSAND DOLLARS (\$1,000.00) PER CALENDAR DAY. SUCH DAMAGES WILL COMMENCE ON THE DAY AFTER THE COMPLETION DATE OR THE DAY AFTER ANY LISTED MILESTONE DATE IN THE NOTICE TO PROCEED.

WITHIN TEN (10) CONSECUTIVE CALENDAR DAYS AFTER THE DATE OF THE NOTICE OF AWARD, THE BIDDER SHALL EXECUTE THE CONTRACT AND FURNISH THE REQUIRED PERFORMANCE BOND, PAYMENT BOND AND INSURANCES.

THE BOARD OF EDUCATION OF THE DISTRICT RESERVES THE RIGHT TO AWARD THIS CONTRACT TO OTHER THAN THE LOW BIDDER IF THE LAW SO PERMITS.

THE UNDERSIGNED HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (IF ANY):

ADDENDUM NO.

DATED

SPECIFIC DAMAGES WILL BE ASSESSED AND DEDUCTED FROM AMOUNTS OTHERWISE DUE THE CONTRACTOR FOR ADDITIONAL INSPECTION (FIELD) AND CONTRACT ADMINISTRATION (OFFICE) TIME EXPENDED BY THE ARCHITECT/ENGINEER AND/OR OTHER CONSTRUCTION EMPLOYEE(S) HIRED TO ADMINISTER OR OBSERVE THE CONTRACT, SHOULD THE CONTRACTOR COMPLETE THE CONTRACT BEYOND THE CONTRACT COMPLETION PERIOD SPECIFIED ABOVE.

SUCH DEDUCTION SHALL BE IN ACCORDANCE WITH THE ARCHITECT, ENGINEER'S, AND/OR OTHER CONSTRUCTION EMPLOYEE(S) STANDARD HOURLY BILLING RATES IN EFFECT AT THE TIME FOR THE SCHOOL DISTRICT.

THE REQUIREMENTS OF THE PROPOSAL HAVE BEEN COMPLETELY READ, UNDERSTOOD AND ACKNOWLEDGED BY THE BIDDER.

BIDDER: _____

BIDDER'S ADDRESS: _____

SIGNED BY: _____ TITLE: _____

DATE: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but not later than twenty-four (24) hours:

DAY: () _____ NIGHT: () _____

FAX: () _____

FEDERAL I.D. NO. OR SOCIAL SECURITY NO.: _____

Note: The bidder is asked to use either black ink or typewriter (black ribbon) in completing this proposal form. Each line item amount must be completed. Failure to do so will be grounds for disqualification of the bidder.

BASE BID: Contract G – General Construction and Abatement Work

ITEM 1 – BONDS and INSURANCES

(written in words) _____ (\$)

ITEM 2 – MOBILIZATION

(written in words) _____ (\$)

ITEM 3 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words) _____ (\$)

ITEM 4 – DIVISION 1 – PROJECT SUPERVISION

(written in words) _____ (\$)

ITEM 5 – DIVISION 2 – ABATEMENT WORK

(written in words) _____ (\$)

ITEM 6 – DIVISION 2 – DEMOLITION WORK

(written in words) _____ (\$)

ITEM 7 – DIVISION 4 – MASONRY

(written in words) _____ (\$)

ITEM 8 – DIVISION 5 – METALS

(written in words) _____ (\$)

ITEM 9 – DIVISION 6 – WOOD, PLASTICS AND COMPOSITES

(written in words) _____ (\$)

ITEM 10 – DIVISION 7 – THERMAL AND MOISTURE PROTECTION

(written in words) _____ (\$)

ITEM 11 – DIVISION 8 - OPENINGS

(written in words) _____ (\$)

ITEM 12 – DIVISION 9 - FINISHES

(written in words) _____ (\$)

ITEM 13 – AS-BUILT DRAWINGS

(written in words) _____ (\$ _____)

ITEM 14 – PROJECT CLOSEOUT

(written in words) _____ (\$ _____)

ALLOWANCE G1 – ALLOWANCE FOR GENERAL CONTINGENCY

(written in words) Seventy Five Thousand Dollars and 00 Cents (\$ 75,000.00)

TOTAL BASE BID (ITEMS 1 – 15 INCLUSIVE, PLUS ALLOWANCES G1)

(written in words) _____ (\$ _____)

ALTERNATES

The contractor shall clearly state whether cost indicated is to be added to or deducted from the base bid cost. Failure to clearly state same will be grounds for disqualification of the bidder. All work included under this heading shall be subject to the general conditions of the project. All construction, workmanship and finishes required by the alternates shall be as specified in the applicable sections of the specifications manual.

The undersigned proposes and agrees that should the following alternates be accepted and included in the contract, the amount of the TOTAL BASE BID will be revised as follows. The undersigned further agrees that should the following Alternates be accepted at a subsequent date, after the base bid contract is awarded, due to additional funds provided to the school district through a Smart Schools Bond Act, the alternate bid prices indicated shall be held and honored for a period of one year from the date of contract signing.

NUMBER	DESCRIPTION	COST
ALT-W1 (Add)	Provide all labor and material associated with the removal and replacement of the cupola windows and access door.	(\$ _____)
ALT-W2 (Add)	Provide all labor and materials associated with the removal and replacements of the windows at the upper gym.	(\$ _____)
ALT-W3 (Add)	Provide all labor and materials associated with the removal and replacements of the windows at 1st floor Computer Lab 214 (Window 'Z'), CCA 213 (window 'Z'), Classroom 313 (Window 'II'), Auditorium (Window 'Z'), Office 107A (Window 'DD'), Toilet 107D (Window 'DD'), Storage 108 (Window 'DD'), Cafeteria 111 (Window 'GG'), Fan Room 117A (Window 'GG'), Toilet 120A (Window 'I'), Storage 120 (Window 'M'), Cust. Lounge 119 (Window 'M'), Toilet 119A (Window 'N')	(\$ _____)

Note: The WHITE PLAINS CITY SCHOOL DISTRICT is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

EACH BIDDER SHALL SUBMIT WITH IT'S BID A SEPARATE SEALED LIST THAT NAMES THE SUBCONTRACTORS THAT THE BIDDER WILL USE TO PERFORM WORK AND THE AGREED UPON AMOUNT TO BE PAID FOR A.) HEATING, VENTILATION AND AIR-CONDITIONING WORK, B.)

PLUMBING WORK AND C.) ELECTRICAL WORK. AFTER THE LOW BID IS ANNOUNCED, THE SEALED LIST OF SUBCONTRACTORS SUBMITTED BY THE APPARENT LOW BIDDER SHALL BE OPENED AND THE NAMES OF THE SUBCONTRACTORS ANNOUNCED. ANY CHANGE OF SUBCONTRACTOR OR AGREED UPON AMOUNT TO BE PAID SHALL REQUIRE THE APPROVAL OF THE PUBLIC OWNER, UPON A SHOWING OF "LEGITIMATE CONSTRUCTION NEED" FOR SUCH CHANGE.

"LEGITIMATE CONSTRUCTION NEED" SHALL INCLUDE, BUT NOT BE LIMITED TO:

A CHANGE IN PROJECT SPECIFICATIONS,
A CHANGE IN CONSTRUCTION MATERIAL COSTS,
A CHANGE IN SUBCONTRACTOR STATUS, OR
THE SUBCONTRACTOR HAS BECOME UNWILLING, UNABLE OR UNAVAILABLE TO PERFORM THE SUBCONTRACT.

THE SEALED LISTS OF SUBCONTRACTORS SUBMITTED BY ALL OTHER BIDDERS SHALL BE RETURNED TO THEM UNOPENED AFTER THE CONTRACT AWARD.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS AS OPPOSED TO 15 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY WITHIN 7 CALENDAR DAYS WILL RESULT IN INTEREST DUE FOR ALL CALENDAR DAYS SUBSEQUENT TO THE SEVENTH DAY THROUGH THE DATE THAT PAYMENT IS MADE.

THE BIDDER UNDERSTANDS THAT THE OWNER RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS AND TO WAIVE ANY INFORMALITIES IN THE BIDDING.

THE BIDDER AGREES THAT THE BID SHALL BE GOOD AND MAY NOT BE WITHDRAWN FOR A PERIOD OF **FORTY-FIVE (45)** CALENDAR DAYS AFTER THE SCHEDULED CLOSING TIME FOR RECEIVING BIDS.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLE 6(W) OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR HIS OR HER STAFF, SUBCONTRACTORS AND SUPPLIERS FOR THE DURATION OF THIS PROJECT. A COMPETENT SUPERINTENDENT SHALL BE IN ATTENDANCE AT THE JOB SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED UNDER THEIR CONTRACT. THE SUPERINTENDENT IS RESPONSIBLE TO VISIT THE JOB SITE DAILY WHEN WORK IS NOT BEING PERFORMED UNDER THEIR CONTRACT AND TO MONITOR THE OVERALL CONSTRUCTION PROGRESS. A QUALIFIED SITE SUPERINTENDENT MUST HAVE THE AUTHORITY TO REPRESENT AND MAKE DECISIONS FOR HIS OR HER COMPANY WITH REGARDS TO THE SUBJECT JOB, MUST BE ABLE TO GIVE GUIDANCE AND DIRECTION TO EMPLOYEES, SUBCONTRACTORS AND SUPPLIERS, AND MUST BE KNOWLEDGEABLE ABOUT THE WORK TO BE PROVIDED. FAILURE TO PROVIDE A QUALIFIED SITE SUPERINTENDENT AT THE JOB SITE SHALL SUBJECT SAID PRIME CONTRACTOR TO A PENALTY OF \$1,000 PER DAY FOR EVERY OCCURRENCE.

TIME OF COMPLETION

ALL WORK UNDER THIS CONTRACT SHALL BE COMPLETED BETWEEN THE FOLLOWING HOURS, IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS: Monday – Saturday

WORK HOURS: 7:00 AM - 8:00 PM

CONSTRUCTION START DATE: TBD, 2024

SUBSTANTIAL COMPLETION: TBD, 2024

FINAL COMPLETION: TBD, 2024

IF NECESSARY, WEEKEND, HOLIDAY AND EVENING WORK SHALL BE PROVIDED TO ENSURE THE COMPLETION DATES LISTED ABOVE, AT THE SOLE COST AND EXPENSE OF THE BIDDER.

FAILURE OF THE CONTRACTOR TO COMPLETE WORK BY THE SPECIFIED TIME SHALL SUBJECT HIM/HER TO LIQUIDATED DAMAGES AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS.

THE ARCHITECT/ENGINEER SHALL ACT AS THE RECORD KEEPER OF CONTRACT DAYS; HE WILL BE THE SOLE JUDGE OF DELAYS CAUSED BY WEATHER. ONLY WEATHER DELAYS, AS ADJUDGED BY THE ARCHITECT/ENGINEER, WILL BE CONSIDERED FOR EXTENSIONS OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL SUBMIT A BI-WEEKLY REQUEST FOR DELAYS DUE TO WEATHER TO THE ARCHITECT/ENGINEER FOR APPROVAL. NO OTHER DELAY CLAIMS WILL BE ACCEPTED, FOR CREDIT TOWARDS THE PROJECT COMPLETION SCHEDULE, REGARDLESS OF THE SOURCE OF THE DELAY.

FAILURE OF THE CONTRACTOR TO COMPLETE ALL WORK SHOWN AND SPECIFIED IN THE CONTRACT DOCUMENTS, BY ALL OF THE SPECIFIED TIME FRAMES, SHALL SUBJECT THE CONTRACTOR TO LIQUIDATED DAMAGES, AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, IN THE SUM OF ONE THOUSAND DOLLARS (\$1,000.00) PER CALENDAR DAY. SUCH DAMAGES WILL COMMENCE ON THE DAY AFTER THE COMPLETION DATE OR THE DAY AFTER ANY LISTED MILESTONE DATE IN THE NOTICE TO PROCEED.

WITHIN TEN (10) CONSECUTIVE CALENDAR DAYS AFTER THE DATE OF THE NOTICE OF AWARD, THE BIDDER SHALL EXECUTE THE CONTRACT AND FURNISH THE REQUIRED PERFORMANCE BOND, PAYMENT BOND AND INSURANCES.

THE BOARD OF EDUCATION OF THE DISTRICT RESERVES THE RIGHT TO AWARD THIS CONTRACT TO OTHER THAN THE LOW BIDDER IF THE LAW SO PERMITS.

THE UNDERSIGNED HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (IF ANY):

ADDENDUM NO.

DATED

SPECIFIC DAMAGES WILL BE ASSESSED AND DEDUCTED FROM AMOUNTS OTHERWISE DUE THE CONTRACTOR FOR ADDITIONAL INSPECTION (FIELD) AND CONTRACT ADMINISTRATION (OFFICE) TIME EXPENDED BY THE ARCHITECT/ENGINEER AND/OR OTHER CONSTRUCTION EMPLOYEE(S) HIRED TO ADMINISTER OR OBSERVE THE CONTRACT, SHOULD THE CONTRACTOR COMPLETE THE CONTRACT BEYOND THE CONTRACT COMPLETION PERIOD SPECIFIED ABOVE.

SUCH DEDUCTION SHALL BE IN ACCORDANCE WITH THE ARCHITECT, ENGINEER'S, AND/OR OTHER CONSTRUCTION EMPLOYEE(S) STANDARD HOURLY BILLING RATES IN EFFECT AT THE TIME FOR THE SCHOOL DISTRICT.

THE REQUIREMENTS OF THE PROPOSAL HAVE BEEN COMPLETELY READ, UNDERSTOOD AND ACKNOWLEDGED BY THE BIDDER.

BIDDER: _____

BIDDER'S ADDRESS: _____

SIGNED BY: _____ TITLE: _____

DATE: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but not later than twenty-four (24) hours:

DAY: () _____ NIGHT: () _____

FAX: () _____

FEDERAL I.D. NO. OR SOCIAL SECURITY NO.: _____

Note: The bidder is asked to use either black ink or typewriter (black ribbon) in completing this proposal form. Each line item amount must be completed. Failure to do so will be grounds for disqualification of the bidder.

BASE BID: Contract M – HVAC Construction Work
--

ITEM 1 – BONDS and INSURANCES

(written in words) _____ (\$)

ITEM 2 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words) _____ (\$)

ITEM 3 – DIVISION 1 – MOBILIZATION

(written in words) _____ (\$)

ITEM 4 – DIVISION 1 – PROJECT SUPERVISION

(written in words) _____ (\$)

ITEM 5 – DIVISION 2 – EXISTING CONDITIONS & DEMOLITION WORK

(written in words) _____ (\$)

ITEM 6 – DIVISION 7 – FIRE STOPPING

(written in words) _____ (\$)

ITEM 7 – DIVISION 23 – PIPE, VALVES, FITTINGS, PIPE HANGERS AND SUPPORTS

(written in words) _____ (\$)

ITEM 8 – DIVISION 23 – MECHANICAL SYSTEM IDENTIFICATION

(written in words) _____ (\$)

ITEM 9 – DIVISION 23 – BALANCING OF AIR SYSTEMS

(written in words) _____ (\$)

ITEM 10 – DIVISION 23 – PIPING & DUCTWORK INSULATION

(written in words) _____ (\$)

ITEM 11 – DIVISION 23 – CONTROLS

(written in words) _____ (\$)

ITEM 12 – DIVISION 23 – SHEET METAL WORK

(written in words) _____ (\$)

ITEM 13 – DIVISION 23 – DIFFUSERS, REGISTERS AND GRILLES

(written in words) _____ (\$ _____)

ITEM 14 – AS-BUILT DRAWINGS

(written in words) _____ (\$ _____)

ITEM 15 – PROJECT CLOSEOUT

(written in words) _____ (\$ _____)

ALLOWANCE H1 – ALLOWANCE FOR GENERAL CONTINGENCY

(written in words) Forty Thousand Dollars and 00 Cents (**\$50,000.00**)

TOTAL BASE BID (ITEMS 1 –14 INCLUSIVE, PLUS ALLOWANCE H1)

(written in words) _____ (\$ _____)

Note: The WHITE PLAINS CITY SCHOOL DISTRICT is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

EACH BIDDER SHALL SUBMIT WITH THEIR BID A SEPARATE SEALED LIST THAT NAMES THE SUBCONTRACTORS THAT THE BIDDER WILL USE TO PERFORM WORK AND THE AGREED UPON AMOUNT TO BE PAID AFTER THE LOW BID IS ANNOUNCED, THE SEALED LIST OF SUBCONTRACTORS SUBMITTED BY THE APPARENT LOW BIDDER SHALL BE OPENED AND THE NAMES OF THE SUBCONTRACTORS ANNOUNCED. ANY CHANGE OF SUBCONTRACTOR OR AGREED UPON AMOUNT TO BE PAID SHALL REQUIRE THE APPROVAL OF THE OWNER, UPON A SHOWING OF "LEGITIMATE CONSTRUCTION NEED" FOR SUCH CHANGE.

"LEGITIMATE CONSTRUCTION NEED" SHALL INCLUDE, BUT NOT BE LIMITED TO:

A CHANGE IN PROJECT SPECIFICATIONS,
A CHANGE IN CONSTRUCTION MATERIAL COSTS,
A CHANGE IN SUBCONTRACTOR STATUS, OR
THE SUBCONTRACTOR HAS BECOME UNWILLING, UNABLE OR UNAVAILABLE TO PERFORM THE SUBCONTRACT.

THE SEALED LISTS OF SUBCONTRACTORS SUBMITTED BY ALL OTHER BIDDERS SHALL BE RETURNED TO THEM UNOPENED AFTER THE CONTRACT AWARD.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS AS OPPOSED TO 15 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY WITHIN 7 CALENDAR DAYS WILL RESULT IN INTEREST DUE FOR ALL CALENDAR DAYS SUBSEQUENT TO THE SEVENTH DAY THROUGH THE DATE THAT PAYMENT IS MADE.

THE BIDDER UNDERSTANDS THAT THE OWNER RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS AND TO WAIVE ANY INFORMALITIES IN THE BIDDING.

THE BIDDER AGREES THAT THE BID SHALL BE GOOD AND MAY NOT BE WITHDRAWN FOR A PERIOD OF **FORTY-FIVE (45)** CALENDAR DAYS AFTER THE SCHEDULED CLOSING TIME FOR RECEIVING BIDS.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLE 6(W) OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR HIS OR HER STAFF, SUBCONTRACTORS AND SUPPLIERS FOR THE DURATION OF THIS PROJECT. A COMPETENT SUPERINTENDENT SHALL BE IN ATTENDANCE AT THE JOB SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED UNDER THEIR CONTRACT. THE SUPERINTENDENT IS RESPONSIBLE TO VISIT THE JOB SITE DAILY WHEN WORK IS NOT BEING PERFORMED UNDER THEIR CONTRACT AND TO MONITOR THE OVERALL CONSTRUCTION PROGRESS. A QUALIFIED SITE SUPERINTENDENT MUST HAVE THE AUTHORITY TO REPRESENT AND MAKE DECISIONS FOR HIS OR HER COMPANY WITH REGARDS TO THE SUBJECT JOB, MUST BE ABLE TO GIVE GUIDANCE AND DIRECTION TO EMPLOYEES, SUBCONTRACTORS AND SUPPLIERS, AND MUST BE KNOWLEDGEABLE ABOUT THE WORK TO BE PROVIDED. FAILURE TO PROVIDE A QUALIFIED SITE SUPERINTENDENT AT THE JOB SITE SHALL SUBJECT SAID PRIME CONTRACTOR TO A PENALTY OF \$1,000 PER DAY FOR EVERY OCCURRENCE.

TIME OF COMPLETION

ALL WORK UNDER THIS CONTRACT SHALL BE COMPLETED BETWEEN THE FOLLOWING HOURS, IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS:	Monday – Friday
WORK HOURS:	7:00 AM - 4:00 PM
CONSTRUCTION START DATE:	TBD, 2024
SUBSTANTIAL COMPLETION:	TBD, 2024
FINAL COMPLETION:	TBD, 2024

IF NECESSARY, WEEKEND, HOLIDAY AND EVENING WORK SHALL BE PROVIDED TO ENSURE THE COMPLETION DATES LISTED ABOVE, AT THE SOLE COST AND EXPENSE OF THE BIDDER.

FAILURE OF THE CONTRACTOR TO COMPLETE WORK BY THE SPECIFIED TIME SHALL SUBJECT HIM/HER TO LIQUIDATED DAMAGES AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS.

THE ARCHITECT/ENGINEER SHALL ACT AS THE RECORD KEEPER OF CONTRACT DAYS; HE WILL BE THE SOLE JUDGE OF DELAYS CAUSED BY WEATHER. ONLY WEATHER DELAYS, AS ADJUDGED BY THE ARCHITECT/ENGINEER, WILL BE CONSIDERED FOR EXTENSIONS OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL SUBMIT A BI-WEEKLY REQUEST FOR DELAYS DUE TO WEATHER TO THE ARCHITECT/ENGINEER FOR APPROVAL. NO OTHER DELAY CLAIMS WILL BE ACCEPTED, FOR CREDIT TOWARDS THE PROJECT COMPLETION SCHEDULE, REGARDLESS OF THE SOURCE OF THE DELAY.

FAILURE OF THE CONTRACTOR TO COMPLETE ALL WORK SHOWN AND SPECIFIED IN THE CONTRACT DOCUMENTS, BY ALL OF THE SPECIFIED TIME FRAMES, SHALL SUBJECT THE CONTRACTOR TO LIQUIDATED DAMAGES, AS SET FORTH IN ARTICLE 13 OF THE GENERAL

NOTICE TO BIDDERS
WHITE PLAINS CITY SCHOOL DISTRICT



CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, IN THE SUM OF ONE THOUSAND DOLLARS (\$1,000.00) PER CALENDAR DAY. SUCH DAMAGES WILL COMMENCE ON THE DAY AFTER THE COMPLETION DATE OR THE DAY AFTER ANY LISTED MILESTONE DATE IN THE NOTICE TO PROCEED.

WITHIN TEN (10) CONSECUTIVE CALENDAR DAYS AFTER THE DATE OF THE NOTICE OF AWARD, THE BIDDER SHALL EXECUTE THE CONTRACT AND FURNISH THE REQUIRED PERFORMANCE BOND, PAYMENT BOND AND INSURANCES.

THE BOARD OF EDUCATION OF THE DISTRICT RESERVES THE RIGHT TO AWARD THIS CONTRACT TO OTHER THAN THE LOW BIDDER IF THE LAW SO PERMITS.

THE UNDERSIGNED HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (IF ANY):

ADDENDUM NO.

DATED

SPECIFIC DAMAGES WILL BE ASSESSED AND DEDUCTED FROM AMOUNTS OTHERWISE DUE THE CONTRACTOR FOR ADDITIONAL INSPECTION (FIELD) AND CONTRACT ADMINISTRATION (OFFICE) TIME EXPENDED BY THE ARCHITECT/ENGINEER AND/OR OTHER CONSTRUCTION EMPLOYEE(S) HIRED TO ADMINISTER OR OBSERVE THE CONTRACT, SHOULD THE CONTRACTOR COMPLETE THE CONTRACT BEYOND THE CONTRACT COMPLETION PERIOD SPECIFIED ABOVE.

SUCH DEDUCTION SHALL BE IN ACCORDANCE WITH THE ARCHITECT, ENGINEER'S, AND/OR OTHER CONSTRUCTION EMPLOYEE(S) STANDARD HOURLY BILLING RATES IN EFFECT AT THE TIME FOR THE SCHOOL DISTRICT.

THE REQUIREMENTS OF THE PROPOSAL HAVE BEEN COMPLETELY READ, UNDERSTOOD AND ACKNOWLEDGED BY THE BIDDER.

BIDDER: _____

BIDDER'S ADDRESS: _____

SIGNED BY: _____ TITLE: _____

DATE: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but not later than twenty-four (24) hours:

DAY: () _____ NIGHT: () _____

FAX: () _____

FEDERAL I.D. NO. OR SOCIAL SECURITY NO.: _____

Note: The bidder is asked to use either black ink or typewriter (black ribbon) in completing this proposal form. Each line item amount must be completed. Failure to do so will be grounds for disqualification of the bidder.

BASE BID: Contract E – Electrical Construction Work
--

ITEM 1 – BONDS and INSURANCES

(written in words) _____ (\$)

ITEM 2 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words) _____ (\$)

ITEM 3 – DIVISION 1 – MOBILIZATION

(written in words) _____ (\$)

ITEM 4 – DIVISION 1 – PROJECT SUPERVISION

(written in words) _____ (\$)

ITEM 5 – DIVISION 2 – EXISTING CONDITIONS & DEMOLITION WORK

(written in words) _____ (\$)

ITEM 6 – DIVISION 7 – FIRE STOPPING

(written in words) _____ (\$)

ITEM 7 – DIVISION 11 – EQUIPMENT

(written in words) _____ (\$)

ITEM 8 – DIVISION 26 – ELECTRICAL DEMOLITION

(written in words) _____ (\$)

ITEM 9 – DIVISION 26 – GROUNDING AND BONDING

(written in words) _____ (\$)

ITEM 10 – DIVISION 26 – SUPPORT DEVICES and HANGERS

(written in words) _____ (\$)

ITEM 11 – DIVISION 26 – ELECTRICAL IDENTIFICATION

(written in words) _____ (\$)

ITEM 12 – DIVISION 26 – SWITCHGEAR

(written in words) _____ (\$)

ITEM 13 – DIVISION 26 – PANELBOARDS

(written in words) _____ (\$)

ITEM 14 – DIVISION 26 – WIRING DEVICES

(written in words) _____ (\$)

ITEM 15 – DIVISION 26 - UTILITY SERVICES

(written in words) _____ (\$)

ITEM 16 – DIVISION 28 – TEMPORARY CONTROLS

(written in words) _____ (\$)

ITEM 17 – DIVISION 31 & 32 – EARTHWORK & EXTERIOR IMPROVEMENTS

(written in words) _____ (\$)

ITEM 18 – AS-BUILT DRAWINGS

(written in words) _____ (\$)

ITEM 19 – PROJECT CLOSEOUT

(written in words) _____ (\$)

ALLOWANCE E1 – ALLOWANCE FOR GENERAL CONTINGENCY

(written in words) Fifty Thousand Dollars and 00 Cents (\$40,000.00)

TOTAL BASE BID (ITEMS 1 –18 INCLUSIVE, PLUS ALLOWANCE E1)

(written in words) _____ (\$)

Note: The WHITE PLAINS CITY SCHOOL DISTRICT is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

EACH BIDDER SHALL SUBMIT WITH THEIR BID A SEPARATE SEALED LIST THAT NAMES THE SUBCONTRACTORS THAT THE BIDDER WILL USE TO PERFORM WORK AND THE AGREED UPON AMOUNT TO BE PAID AFTER THE LOW BID IS ANNOUNCED, THE SEALED LIST OF SUBCONTRACTORS SUBMITTED BY THE APPARENT LOW BIDDER SHALL BE OPENED AND THE NAMES OF THE SUBCONTRACTORS ANNOUNCED. ANY CHANGE OF SUBCONTRACTOR OR AGREED UPON AMOUNT TO BE PAID SHALL REQUIRE THE APPROVAL OF THE OWNER, UPON A SHOWING OF "LEGITIMATE CONSTRUCTION NEED" FOR SUCH CHANGE.

"LEGITIMATE CONSTRUCTION NEED" SHALL INCLUDE, BUT NOT BE LIMITED TO:

A CHANGE IN PROJECT SPECIFICATIONS,
A CHANGE IN CONSTRUCTION MATERIAL COSTS,
A CHANGE IN SUBCONTRACTOR STATUS, OR

THE SUBCONTRACTOR HAS BECOME UNWILLING, UNABLE OR UNAVAILABLE TO PERFORM THE SUBCONTRACT.

THE SEALED LISTS OF SUBCONTRACTORS SUBMITTED BY ALL OTHER BIDDERS SHALL BE RETURNED TO THEM UNOPENED AFTER THE CONTRACT AWARD.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS AS OPPOSED TO 15 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY WITHIN 7 CALENDAR DAYS WILL RESULT IN INTEREST DUE FOR ALL CALENDAR DAYS SUBSEQUENT TO THE SEVENTH DAY THROUGH THE DATE THAT PAYMENT IS MADE.

THE BIDDER UNDERSTANDS THAT THE OWNER RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS AND TO WAIVE ANY INFORMALITIES IN THE BIDDING.

THE BIDDER AGREES THAT THE BID SHALL BE GOOD AND MAY NOT BE WITHDRAWN FOR A PERIOD OF **FORTY-FIVE (45)** CALENDAR DAYS AFTER THE SCHEDULED CLOSING TIME FOR RECEIVING BIDS.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLE 6(W) OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR HIS OR HER STAFF, SUBCONTRACTORS AND SUPPLIERS FOR THE DURATION OF THIS PROJECT. A COMPETENT SUPERINTENDENT SHALL BE IN ATTENDANCE AT THE JOB SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED UNDER THEIR CONTRACT. THE SUPERINTENDENT IS RESPONSIBLE TO VISIT THE JOB SITE DAILY WHEN WORK IS NOT BEING PERFORMED UNDER THEIR CONTRACT AND TO MONITOR THE OVERALL CONSTRUCTION PROGRESS. A QUALIFIED SITE SUPERINTENDENT MUST HAVE THE AUTHORITY TO REPRESENT AND MAKE DECISIONS FOR HIS OR HER COMPANY WITH REGARDS TO THE SUBJECT JOB, MUST BE ABLE TO GIVE GUIDANCE AND DIRECTION TO EMPLOYEES, SUBCONTRACTORS AND SUPPLIERS, AND MUST BE KNOWLEDGEABLE ABOUT THE WORK TO BE PROVIDED. FAILURE TO PROVIDE A QUALIFIED SITE SUPERINTENDENT AT THE JOB SITE SHALL SUBJECT SAID PRIME CONTRACTOR TO A PENALTY OF \$1,000 PER DAY FOR EVERY OCCURRENCE.

TIME OF COMPLETION

ALL WORK UNDER THIS CONTRACT SHALL BE COMPLETED BETWEEN THE FOLLOWING HOURS, IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS:	Monday – Friday
WORK HOURS:	7:00 AM - 4:00 PM
CONSTRUCTION START DATE:	TBD, 2023
SUBSTANTIAL COMPLETION:	TBD, 2024
FINAL COMPLETION:	TBD, 2024

IF NECESSARY, WEEKEND, HOLIDAY AND EVENING WORK SHALL BE PROVIDED TO ENSURE THE COMPLETION DATES LISTED ABOVE, AT THE SOLE COST AND EXPENSE OF THE BIDDER.

FAILURE OF THE CONTRACTOR TO COMPLETE WORK BY THE SPECIFIED TIME SHALL SUBJECT HIM/HER TO LIQUIDATED DAMAGES AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS.

THE ARCHITECT/ENGINEER SHALL ACT AS THE RECORD KEEPER OF CONTRACT DAYS; HE WILL BE THE SOLE JUDGE OF DELAYS CAUSED BY WEATHER. ONLY WEATHER DELAYS, AS ADJUDGED BY THE ARCHITECT/ENGINEER, WILL BE CONSIDERED FOR EXTENSIONS OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL SUBMIT A BI-WEEKLY REQUEST FOR DELAYS DUE TO WEATHER TO THE ARCHITECT/ENGINEER FOR APPROVAL. NO OTHER DELAY CLAIMS WILL BE ACCEPTED, FOR CREDIT TOWARDS THE PROJECT COMPLETION SCHEDULE, REGARDLESS OF THE SOURCE OF THE DELAY.

FAILURE OF THE CONTRACTOR TO COMPLETE ALL WORK SHOWN AND SPECIFIED IN THE CONTRACT DOCUMENTS, BY ALL OF THE SPECIFIED TIME FRAMES, SHALL SUBJECT THE CONTRACTOR TO LIQUIDATED DAMAGES, AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, IN THE SUM OF ONE THOUSAND DOLLARS (\$1,000.00) PER CALENDAR DAY. SUCH DAMAGES WILL COMMENCE ON THE DAY AFTER THE COMPLETION DATE OR THE DAY AFTER ANY LISTED MILESTONE DATE IN THE NOTICE TO PROCEED.

WITHIN TEN (10) CONSECUTIVE CALENDAR DAYS AFTER THE DATE OF THE NOTICE OF AWARD, THE BIDDER SHALL EXECUTE THE CONTRACT AND FURNISH THE REQUIRED PERFORMANCE BOND, PAYMENT BOND AND INSURANCES.

THE BOARD OF EDUCATION OF THE DISTRICT RESERVES THE RIGHT TO AWARD THIS CONTRACT TO OTHER THAN THE LOW BIDDER IF THE LAW SO PERMITS.

THE UNDERSIGNED HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (IF ANY):

ADDENDUM NO.

DATED

SPECIFIC DAMAGES WILL BE ASSESSED AND DEDUCTED FROM AMOUNTS OTHERWISE DUE THE CONTRACTOR FOR ADDITIONAL INSPECTION (FIELD) AND CONTRACT ADMINISTRATION (OFFICE) TIME EXPENDED BY THE ARCHITECT/ENGINEER AND/OR OTHER CONSTRUCTION EMPLOYEE(S) HIRED TO ADMINISTER OR OBSERVE THE CONTRACT, SHOULD THE CONTRACTOR COMPLETE THE CONTRACT BEYOND THE CONTRACT COMPLETION PERIOD SPECIFIED ABOVE.

SUCH DEDUCTION SHALL BE IN ACCORDANCE WITH THE ARCHITECT, ENGINEER'S, AND/OR OTHER CONSTRUCTION EMPLOYEE(S) STANDARD HOURLY BILLING RATES IN EFFECT AT THE TIME FOR THE SCHOOL DISTRICT.

THE REQUIREMENTS OF THE PROPOSAL HAVE BEEN COMPLETELY READ, UNDERSTOOD AND ACKNOWLEDGED BY THE BIDDER.

BIDDER: _____

BIDDER'S ADDRESS: _____

NOTICE TO BIDDERS
WHITE PLAINS CITY SCHOOL DISTRICT



SIGNED BY: _____ TITLE: _____

DATE: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but not later than twenty-four (24) hours:

DAY: () _____ NIGHT: () _____

FAX: () _____

FEDERAL I.D. NO. OR SOCIAL SECURITY NO.: _____

Note: The bidder is asked to use either black ink or typewriter (black ribbon) in completing this proposal form. Each line item amount must be completed. Failure to do so will be grounds for disqualification of the bidder.

BASE BID: Contract P- PLUMBING WORK

ITEM 1 – BONDS and INSURANCES

(written in words) _____ (\$)

ITEM 2 – DIVISION 1 – GENERAL REQUIREMENTS

(written in words) _____ (\$)

ITEM 3 – DIVISION 1 – MOBILIZATION

(written in words) _____ (\$)

ITEM 4 – DIVISION 1 – PROJECT SUPERVISION

(written in words) _____ (\$)

ITEM 5 – DIVISION 22 – PLUMBING DEMOLITION WORK

(written in words) _____ (\$)

ITEM 6 – DIVISION 22 – WATER SUPPLY SYSTEM

(written in words) _____ (\$)

ITEM 7 – DIVISION 22 – PLUMBING EQUIPMENT

(written in words) _____ (\$)

ITEM 8 – DIVISION 22 – ALL OTHER PLUMBING CONTRACT ITEMS

(written in words) _____ (\$)

ITEM 9 – AS-BUILT DRAWINGS

(written in words) _____ (\$)

ITEM 10 – PROJECT CLOSEOUT

(written in words) _____ (\$)

ALLOWANCE P1 – ALLOWANCE FOR GENERAL CONTINGENCY

(written in words) Ten Thousand Dollars and 00 Cents (\$25,000.00)

TOTAL BASE BID (ITEMS 1 – 8 INCLUSIVE, PLUS ALLOWANCE P1)

(written in words) _____ (\$)

Note: The WHITE PLAINS CITY SCHOOL DISTRICT is exempt from Federal, New York State and local taxes. TOTAL AMOUNT BID shall be exclusive of all taxes.

EACH BIDDER SHALL SUBMIT WITH THEIR BID A SEPARATE SEALED LIST THAT NAMES THE SUBCONTRACTORS THAT THE BIDDER WILL USE TO PERFORM WORK AND THE AGREED UPON AMOUNT TO BE PAID AFTER THE LOW BID IS ANNOUNCED, THE SEALED LIST OF SUBCONTRACTORS SUBMITTED BY THE APPARENT LOW BIDDER SHALL BE OPENED AND THE NAMES OF THE SUBCONTRACTORS ANNOUNCED. ANY CHANGE OF SUBCONTRACTOR OR AGREED UPON AMOUNT TO BE PAID SHALL REQUIRE THE APPROVAL OF THE OWNER, UPON A SHOWING OF "LEGITIMATE CONSTRUCTION NEED" FOR SUCH CHANGE.

"LEGITIMATE CONSTRUCTION NEED" SHALL INCLUDE, BUT NOT BE LIMITED TO:

A CHANGE IN PROJECT SPECIFICATIONS,
A CHANGE IN CONSTRUCTION MATERIAL COSTS,
A CHANGE IN SUBCONTRACTOR STATUS, OR
THE SUBCONTRACTOR HAS BECOME UNWILLING, UNABLE OR UNAVAILABLE TO PERFORM THE SUBCONTRACT.

THE SEALED LISTS OF SUBCONTRACTORS SUBMITTED BY ALL OTHER BIDDERS SHALL BE RETURNED TO THEM UNOPENED AFTER THE CONTRACT AWARD.

PAYMENTS TO SUBCONTRACTORS AND MATERIAL MEN MUST BE MADE WITHIN 7 CALENDAR DAYS AS OPPOSED TO 15 CALENDAR DAYS OF THE RECEIPT OF PAYMENT FROM THE PUBLIC OWNER. FAILURE TO PAY WITHIN 7 CALENDAR DAYS WILL RESULT IN INTEREST DUE FOR ALL CALENDAR DAYS SUBSEQUENT TO THE SEVENTH DAY THROUGH THE DATE THAT PAYMENT IS MADE.

THE BIDDER UNDERSTANDS THAT THE OWNER RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS AND TO WAIVE ANY INFORMALITIES IN THE BIDDING.

THE BIDDER AGREES THAT THE BID SHALL BE GOOD AND MAY NOT BE WITHDRAWN FOR A PERIOD OF **FORTY-FIVE (45)** CALENDAR DAYS AFTER THE SCHEDULED CLOSING TIME FOR RECEIVING BIDS.

THE BIDDER HAS SUBMITTED ALL REQUESTS FOR OTHER BRAND NAMES OR PRODUCTS NOT LISTED IN THE SPECIFICATIONS IN ACCORDANCE WITH ARTICLE 6(W) OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION.

SITE SUPERVISION

THE SUCCESSFUL CONTRACTOR IS TO PROVIDE FULL TIME SITE SUPERVISION FOR HIS OR HER STAFF, SUBCONTRACTORS AND SUPPLIERS FOR THE DURATION OF THIS PROJECT. A COMPETENT SUPERINTENDENT SHALL BE IN ATTENDANCE AT THE JOB SITE AT ALL TIMES WHEN WORK IS BEING PERFORMED UNDER THEIR CONTRACT. THE SUPERINTENDENT IS RESPONSIBLE TO VISIT THE JOB SITE DAILY WHEN WORK IS NOT BEING PERFORMED UNDER THEIR CONTRACT AND TO MONITOR THE OVERALL CONSTRUCTION PROGRESS. A QUALIFIED SITE SUPERINTENDENT MUST HAVE THE AUTHORITY TO REPRESENT AND MAKE DECISIONS FOR HIS OR HER COMPANY WITH REGARDS TO THE SUBJECT JOB, MUST BE ABLE TO GIVE GUIDANCE AND DIRECTION TO EMPLOYEES, SUBCONTRACTORS AND SUPPLIERS, AND MUST BE KNOWLEDGEABLE ABOUT THE WORK TO BE PROVIDED. FAILURE TO PROVIDE A QUALIFIED SITE SUPERINTENDENT AT THE JOB SITE SHALL SUBJECT SAID PRIME CONTRACTOR TO A PENALTY OF \$1,000 PER DAY FOR EVERY OCCURRENCE.

TIME OF COMPLETION

ALL WORK UNDER THIS CONTRACT SHALL BE COMPLETED BETWEEN THE FOLLOWING HOURS, IN ACCORDANCE WITH THE FOLLOWING DATES:

WORK DAYS:	Monday – Friday
WORK HOURS:	7:00 AM - 4:00 PM
CONSTRUCTION START DATE:	TBD, 2024
SUBSTANTIAL COMPLETION:	TBD, 2024
FINAL COMPLETION:	TBD, 2024

IF NECESSARY, WEEKEND, HOLIDAY AND EVENING WORK SHALL BE PROVIDED TO ENSURE THE COMPLETION DATES LISTED ABOVE, AT THE SOLE COST AND EXPENSE OF THE BIDDER.

FAILURE OF THE CONTRACTOR TO COMPLETE WORK BY THE SPECIFIED TIME SHALL SUBJECT HIM/HER TO LIQUIDATED DAMAGES AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS.

THE ARCHITECT/ENGINEER SHALL ACT AS THE RECORD KEEPER OF CONTRACT DAYS; HE WILL BE THE SOLE JUDGE OF DELAYS CAUSED BY WEATHER. ONLY WEATHER DELAYS, AS ADJUDGED BY THE ARCHITECT/ENGINEER, WILL BE CONSIDERED FOR EXTENSIONS OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL SUBMIT A BI-WEEKLY REQUEST FOR DELAYS DUE TO WEATHER TO THE ARCHITECT/ENGINEER FOR APPROVAL. NO OTHER DELAY CLAIMS WILL BE ACCEPTED, FOR CREDIT TOWARDS THE PROJECT COMPLETION SCHEDULE, REGARDLESS OF THE SOURCE OF THE DELAY.

FAILURE OF THE CONTRACTOR TO COMPLETE ALL WORK SHOWN AND SPECIFIED IN THE CONTRACT DOCUMENTS, BY ALL OF THE SPECIFIED TIME FRAMES, SHALL SUBJECT THE CONTRACTOR TO LIQUIDATED DAMAGES, AS SET FORTH IN ARTICLE 13 OF THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION, IN THE SUM OF ONE THOUSAND DOLLARS (\$1,000.00) PER CALENDAR DAY. SUCH DAMAGES WILL COMMENCE ON THE DAY AFTER THE COMPLETION DATE OR THE DAY AFTER ANY LISTED MILESTONE DATE IN THE NOTICE TO PROCEED.

WITHIN TEN (10) CONSECUTIVE CALENDAR DAYS AFTER THE DATE OF THE NOTICE OF AWARD, THE BIDDER SHALL EXECUTE THE CONTRACT AND FURNISH THE REQUIRED PERFORMANCE BOND, PAYMENT BOND AND INSURANCES.

THE BOARD OF EDUCATION OF THE DISTRICT RESERVES THE RIGHT TO AWARD THIS CONTRACT TO OTHER THAN THE LOW BIDDER IF THE LAW SO PERMITS.

THE UNDERSIGNED HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (IF ANY):

ADDENDUM NO.

DATED

SPECIFIC DAMAGES WILL BE ASSESSED AND DEDUCTED FROM AMOUNTS OTHERWISE DUE THE CONTRACTOR FOR ADDITIONAL INSPECTION (FIELD) AND CONTRACT ADMINISTRATION (OFFICE) TIME EXPENDED BY THE ARCHITECT/ENGINEER AND/OR OTHER CONSTRUCTION EMPLOYEE(S) HIRED TO ADMINISTER OR OBSERVE THE CONTRACT, SHOULD THE CONTRACTOR COMPLETE THE CONTRACT BEYOND THE CONTRACT COMPLETION PERIOD SPECIFIED ABOVE.

SUCH DEDUCTION SHALL BE IN ACCORDANCE WITH THE ARCHITECT, ENGINEER'S, AND/OR OTHER CONSTRUCTION EMPLOYEE(S) STANDARD HOURLY BILLING RATES IN EFFECT AT THE TIME FOR THE SCHOOL DISTRICT.

THE REQUIREMENTS OF THE PROPOSAL HAVE BEEN COMPLETELY READ, UNDERSTOOD AND ACKNOWLEDGED BY THE BIDDER.

BIDDER: _____

BIDDER'S ADDRESS: _____

SIGNED BY: _____ TITLE: _____

DATE: _____

Telephone number where the contractor or a competent representative can accept a telephone message and provide a reasonable reply as soon as possible, but not later than twenty-four (24) hours:

DAY: () _____ NIGHT: () _____

FAX: () _____

FEDERAL I.D. NO. OR SOCIAL SECURITY NO.: _____

PROPOSAL (PC)
WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL

Enclosed in the bid package is a certified check or bid bond for five percent (5%) of the total amount of each of the school project bid as required by the foregoing "Information for Bidders."

On the signing of such contract by the Bidder, the bidder hereby agrees to furnish the indemnifying bonds as provided in the General Conditions.

The Bidder hereby further agrees that in the event of its failure or refusal to enter into a contract in accordance with this bid within ten (10) business days after due notice from the Board of Education that the contract has been awarded to it and is ready for signature, as given in accordance with the Information for Bidders and/or its failure to execute and deliver the bond for the full amount of the contract price, as provided in said Information for Bidders, the Bidder's check or bid bond which is herewith deposited with the Board shall (at the option of said Board) become due and payable as ascertained and liquidated damages for such default; otherwise, said check or bid bond will be returned to the undersigned.

The full names and residences of all persons and parties interested in the foregoing bid as principals are as follows:

Name	Address
_____	_____
_____	_____
_____	_____

Name of Bidder: _____

Business Address of Bidder: _____

END OF SECTION

INSURANCE CERTIFICATION

Your insurance representative must complete the form below to be considered for the award of this bid or project, and it is important that you complete the Bidder's Acknowledgement section of this form. Please note that this Insurance Certification for must accompany your bid submission for your bid to be considered.

Insurance Representative's Acknowledgement:

We have reviewed the insurance requirements set forth in the Supplementary Conditions Article 10 & 11 of the specifications and can provide such insurance to our insured in accordance with such requirements in the event the contract is awarded to our insured and provided our insured pays the appropriate premium.

Insurance Representative:

Address:

Are you an agent for the companies providing the coverage? Yes _____ No _____

Date: _____

Insurance Representative's Signature

Bidder's Acknowledgement:

I acknowledge that I have received the insurance requirements of this bid and have considered the costs, if any, of procuring the required insurance and will be able to supply the insurance required in accordance with the bid, if it is awarded. I understand that this Insurance Certification form must be submitted with my bid and my inability to provide the required insurances may result in the rejection of my bid, and the White Plains City School District may award the contract to the next lowest/responsive bidder.

Name: _____

Address: _____

Date: _____

Bidder's Signature

NON-COLLUSIVE FORM BIDDING CERTIFICATE
BID PROPOSAL CERTIFICATIONS

Firm Name _____

Business Address _____

Telephone Number _____ Date of Bid _____

I. General Bid Certification

The bidder certifies that he will furnish, at the prices quoted, the materials, equipment and/or services as proposed on this Bid.

II. Non-Collusive Bidding Certification

The following statement is made pursuant to Section 103-D of the General Municipal Law, as amended by Chapter 675 of the Laws of 1966, and Section 139-D of the State Finance Law, as amended by Chapter 675 of the Laws of 1966, and Section 2604 of the Public Authorities Law, as amended by Chapter 675 of the Laws of 1966.

By submission of this bid proposal, the bidder certifies that he/she is complying with Section 103-d of the General Municipal Law as follows:

Statement of non-collusion in bids and proposals to political subdivision of the state. Every bid or proposal hereafter made to a political subdivision of the state or any public department, agency or official thereof where competitive bidding is required by statute, rule, regulation, or local law, for work or services performed or to be performed or goods sold or to be sold, shall contain the following statement subscribed by the bidder and affirmed by such bidder as true under the penalties of perjury:

Non-collusive bidding certification.

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

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

2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be

disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and,

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

- (b) A bid shall not be considered for award nor shall any award be made where (a) (1) (2) and (3) above have not been complied with; provided, however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the reasons therefor. Where (a) (1) (2) and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department agency or official thereof to which the bid is made or his designee, determines that such disclosure was not made for the purpose of restricting competition.

The fact that a bidder (a) has published price lists, rates, or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending publication of new or revised price lists for such items, or (c) has sold the same items to other customers at the same prices being bid, does not constitute, without more, a disclosure within the meaning of subparagraph one (a).

- (c) Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certifications referred to in subdivision II of this section, shall be deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing, and submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of corporation.

- (d) The person signing this Bid or Proposal certifies that he has fully informed himself/herself regarding the accuracy of the statements contained in this certification, and under the penalties of perjury, affirms the truth thereof, such penalties being applicable to the Bidder as well to the person signing in his/her behalf."

Signature of Bidder: _____
(Signature of bidder or authorized representative of a corporation)

Title: _____

Sworn to before me this _____ day of _____, 20 _____

HOLD HARMLESS AGREEMENT

In accordance with Article 12 of the General Conditions, Indemnification, the Contractor will be required to sign the following "Hold Harmless" Agreement with the BOARD OF EDUCATION. Compliance with the foregoing requirements for insurance shall not relieve the Contractor from liability set forth under the Indemnity Agreement.

The undersigned hereby agrees to defend, indemnify, and save harmless the BOARD OF EDUCATION, its officers and employees from and against any and all liability, loss, damages, claims for bodily injury and/or property damages, cost and expense, including counsel fees, to the extent permissible by law, that may occur or that may be alleged to have occurred in the course of the performance of this agreement by the contractor, whether such claims shall be made by an employee of the contractor or by a third party, the contractor covenants and agrees that he / she will pay all costs and expenses arising therefrom and in connection therewith, and if any judgment shall be rendered against the Owner, Architect/Engineer & Construction manager, in any such litigation, the Contractor shall at his / her own expense satisfy and discharge the same.

By: _____
(Signature of Authorized Representative of Corporation)

(Print Name and Title)

(Date)

CERTIFICATION OF COMPLIANCE WITH THE IRAN DIVESTMENT ACT

As a result of the Iran Divestment Act of 2012 (the "Act"), Chapter 1 of the 2012 Laws of New York, a new provision has been added to State Finance Law (SFL) § 165-a and New York General Municipal Law § 103-g, both effective April 12, 2012. Under the Act, the Commissioner of the Office of General Services (OGS) will be developing a list of "persons" who are engaged in "investment activities in Iran" (both are defined terms in the law) (the "Prohibited Entities List"). Pursuant to SFL § 165-a(3)(b), the initial list is expected to be issued no later than 120 days after the Act's effective date at which time it will be posted on the OGS website.

By submitting a bid in response to this solicitation or by assuming the responsibility of a Contract awarded hereunder, each Bidder/Contractor, any person signing on behalf of any Bidder/Contractor and any assignee or subcontractor and, in the case of a joint bid, each party thereto, certifies, under penalty of perjury, that once the Prohibited Entities List is posted on the OGS website, that to the best of its knowledge and belief, that each Bidder/Contractor and any subcontractor or assignee is not identified on the Prohibited Entities List created pursuant to SFL § 165-a(3)(b).

Additionally, Bidder/Contractor is advised that once the Prohibited Entities List is posted on the OGS Website, any Bidder/Contractor seeking to renew or extend a Contract or assume the responsibility of a Contract awarded in response to this solicitation must certify at the time the Contract is renewed, extended or assigned that it is not included on the Prohibited Entities List.

During the term of the Contract, should the School District receive information that a Bidder/Contractor is in violation of the above-referenced certification, the School District will offer the person or entity an opportunity to respond. If the person or entity fails to demonstrate that he/she/it has ceased engagement in the investment which is in violation of the Act within 90 days after the determination of such violation, then the School District shall take such action as may be appropriate including, but not limited to, imposing sanctions, seeking compliance, recovering damages or declaring the Bidder/Contractor in default. The School District reserves the right to reject any bid or request for assignment for a Bidder/Contractor that appears on the Prohibited Entities List prior to the award of a contract and to pursue a responsibility review with respect to any Bidder/Contractor that is awarded a contract and subsequently appears on the Prohibited Entities List.

I, _____, being duly sworn, deposes and says that he/she is the _____ of the _____ Corporation and that neither the Bidder/ Contractor nor any proposed subcontractor is identified on the Prohibited Entities List.

(SIGNED)

SWORN to before me this

_____ day of _____

20____

Notary Public: _____

**DECLARATION OF BIDDER'S INABILITY TO PROVIDE CERTIFICATION OF COMPLIANCE WITH
THE IRAN DIVESTMENT ACT**

Bidders shall complete this form if they cannot certify that the bidder /contractor or any proposed subcontractor is not identified on the Prohibited Entities List. The District reserves the right to undertake any investigation into the information provided herein or to request additional information from the bidder.

Name of the Bidder: _____

Address of Bidder: _____

Has bidder been involved in investment activities in Iran? _____

Describe the type of activities including but not limited to the amounts and the nature of the investments (e.g. banking, energy, real estate) _____

If so, when did the first investment activity occur? _____

Have the investment activities ended? _____

If so, what was the date of the last investment activity? _____

If not, have the investment activities increased or expanded since April 12, 2012? _____

Has the bidder adopted, publicized, or implemented a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran? _____

If so, provide the date of the adoption of the plan by the bidder and proof of the adopted resolution, if any and a copy of the formal plan. _____

In detail, state the reasons why the bidder cannot provide the Certification of Compliance with the Iran Divestment Act below (additional pages may be attached):

I, _____ being duly sworn, deposes and says that he/she is the _____ of
the _____ Corporation and the foregoing is true and accurate.

SWORN to before me this

SIGNED

_____ day of _____

20____

Notary Public: _____

**WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL**

SEXUAL HARASSMENT CERTIFICATION

The following certification must be submitted with all bids submitted after January 1, 2019 pursuant to N.Y. State Finance Law § 139-1(1)(a).

"By submission of this bid/proposal, each Bidder and each person signing on behalf of any Bidder certifies, and in the case of a joint bid each party thereto certifies its own organization, under penalty of perjury, that the Bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all of its employees. Such policy shall, at a minimum, meet the requirements of Section 201-g of the Labor Law."

Dated: _____
(Signature Here)

(Signatory's Name Printed)

(Name of Bidder)

**THIS FORM MUST BE COMPLETED BY BIDDER AND INCLUDED IN SEPARATE SEALED
ENVELOPE MARKED "SUB CONTRACTORS LIST"**

(I) PLUMBING AND GAS FITTING

Subcontractor Name:

**Type of
Work:**

Agreed upon amount to be paid subcontractor:

**(II) STEAM HEATING, HOT WATER HEATING, VENTILATING AND AIR CONDITIONING
APPARATUS**

Subcontractor Name:

**Type of
Work:**

Agreed upon amount to be paid subcontractor:

(III) ELECTRIC WIRING AND STANDARD ILLUMINATING FIXTURES

Subcontractor Name:

**Type of
Work:**

Agreed upon amount to be paid subcontractor:

AGREEMENT
WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL

AGREEMENT made as of the _____ day of _____ in the year of Two Thousand and Twenty-_____.

BETWEEN the Owner **WHITE PLAINS CITY SCHOOL DISTRICT**
5 Homeside Lane
White Plains, NY 10605

and the Contractor: Contractor's Name
Address Line 1
Address Line 2

The Project is: RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL
228 FISHER AVENUE

SED CONTROL # ##-##-##-##-#-###-###

CONTRACT _ - ____ CONSTRUCTION

CONTRACT _ - ____ CONSTRUCTION

CONTRACT _ - ____ CONSTRUCTION

CONTRACT _ - ____ CONSTRUCTION

The Architect is: **H2M architects + engineers**
(Name and address) 538 Broad Hollow Road
4 th Floor East
Melville, N.Y 11747

The Owner and Contractor agree as set forth below.

ARTICLE 1
THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General Conditions, Special Provisions and other Conditions), Drawings, specifications, Addenda issued prior to execution of this Agreement, other documents listed in Article 9 of this Agreement and Modifications issued after execution of this Agreement; these form the Contract, and are a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9.

ARTICLE 2
THE WORK OF THIS CONTRACT

The Contractor shall execute the entire Work described in the Contract Documents or reasonably inferable by the Contractor as necessary to produce the results intended by the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3
DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 The date of commencement of the work and substantial completion of the work of this contract shall be in accordance with the schedule set forth in the Project Manual.

3.2 Time is of the essence respecting the contract documents and all obligations thereunder.

3.3 Upon the execution of this Agreement, the Contractor shall provide the Owner with copies of all contracts entered into between the Contractor and subcontractors or material suppliers. The Contractor's obligation to provide the Owner with said contracts shall continue for the duration of the Project.

ARTICLE 4
CONTRACT SUM

4.1 The Owner shall pay the Contractor in current funds for the Contractor's performance of the Contract the Contract Sum of written contract amount , subject to additions and deductions as provided in the Contract Documents.

4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Bid Proposal Form (attached hereto) and are hereby accepted by the Owner:

Insert Alternates

4.3 Unit prices are as set forth in the proposal sheets.

Insert Unit Prices

ARTICLE 5
PROGRESS PAYMENTS

5.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

5.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

All progress payments shall be based upon an estimate and a certificate, made by the Architect, of the materials furnished, installed and suitably stored at the site and the work done by the Contractor, and payment shall be made in installments of ninety-five percent (95%) of the amount certified as earned so that, at the completion of the work, there will be a retainage of five percent (5%) of the Total Contract Sum. Retainage shall be paid to the Contractor upon final completion of the work of this contract. All progress payments made previous to the last and final payment shall be based on estimates and the right is hereby reserved by the Architect for the Owner to make all due and proper corrections in any payment for any previous error.

The Contractor shall submit with each application for payment the following:

1. A current Sworn Statement from the Contractor setting forth all subcontractors and materialmen with whom the Contractor has subcontracted, the amount of such subcontract, the amount requested for any subcontractor or material supplier in the application for payment and the amount to be paid to the Contractor from such progress payment;
2. Commencing with the second (2nd) Application for Payment submitted by the Contractor, duly executed so-called "after the fact" waivers of mechanics' and materialmen's liens from all subcontractors, materialmen and, when appropriate, from lower tier subcontractors, establishing receipt of payment or satisfaction of payment of all amounts requested on behalf of such entities and disbursed prior to submittal by the Contractor of the current Application for Payment, plus sworn statements from all subcontractors, materialmen and, where appropriate, from lower tier subcontractors, covering all amounts described in this Paragraph 5.2;
3. Such other information, documentation and materials as the Owner or the Architect may require.

5.3 Payment shall not be released to the Contractor until the Owner receives the following documentation:

1. Certified payroll for employees and employees of subcontractors performing work on the Project.
2. Copies of invoices submitted to the Contractor by its subcontractors and/or material suppliers.

ARTICLE 6

FINAL PAYMENT

Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when (1) the Contract has been fully performed including compliance with all provisions of the Contract Documents except for the Contractor's responsibility to correct nonconforming Work under Article 15(B) of the General Conditions and to satisfy other requirements, if any, which necessarily survive final payment; and (2) a final Certificate for Payment has been issued by the Architect; such final payment shall be made by the Owner not more than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows or as soon thereafter as is practicable.

ARTICLE 7 **MISCELLANEOUS PROVISIONS**

7.1 Where reference is made in this Agreement to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

7.2 The Contractor represents and warrants the following to the Owner (in addition to any other representations and warranties contained in the Contract Documents) as an inducement to the Owner to execute this Agreement, which representations and warranties shall survive the execution and delivery of this Agreement, any termination of this Agreement and the final completion of the Work:

1. that it and its Subcontractors are financially solvent, able to pay all debts as they mature and possessed of sufficient working capital to complete the Work and perform all obligations hereunder;
2. that it is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform its obligations hereunder;
3. that it is authorized to do business in the State of New York and the United States and properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over it and over the Work and the Project;
4. that its execution of this Agreement and its performance thereof is within its duly authorized powers;
5. that its duly authorized representative has visited the site of the Project, is familiar with the local and special conditions under which the Work is to be performed and has correlated on-site observations with the requirements of the Contract Documents; and
6. that it possesses a high level of experience and expertise in the business administration, construction, construction management and superintendence or projects of the size, complexity and nature of the particular Project, and that it will perform the Work with the care, skill and diligence of such a contractor.

The foregoing warranties are in addition to, and not in lieu of, any and all other liability imposed upon the Contractor by law with respect to the Contractor's duties, obligations and performance hereunder. The Contractor's liability hereunder shall survive the Owner's final acceptance of and payment for the Work.

AGREEMENT
WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL

All representations and warranties set forth in this Agreement, including without limitation, this Paragraph 7.2, shall survive the final completion of the Work or the earlier termination of this Agreement. The Contractor acknowledges that the Owner is relying upon the Contractor's skill and experience in connection with the Work called for hereunder.

ARTICLE 8
TERMINATION OR SUSPENSION

- 8.1** The Contract may be terminated by the Owner as provided in the General Conditions.
- 8.2** The Work may be suspended by the Owner as provided in the General Conditions.

ARTICLE 9
ENUMERATION OF CONTRACT DOCUMENTS

- 9.1** The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated as follows:
- 9.1.1** The Agreement is this executed Agreement between Owner and Contractor.
- 9.1.2** The General Conditions are the General Conditions of the Contract for Construction as set forth in the Project Manual and attached hereto.
- 9.1.3** The Specifications are as set forth in the Project Manual and indexed in table of contents.
- 9.1.4** The Drawings are those as follows:
- Insert Drawing List
- 9.1.5** The Addenda, if any, are as follows:

AGREEMENT
WHITE PLAINS CITY SCHOOL DISTRICT
RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL

This Agreement is entered into as of the day and year first written above and is executed in at least three original copies of which one is to be delivered to the Contractor, one to the Architect for use in the administration of the Contract, and the remainder to the Owner.

OWNER

CONTRACTOR

WHITE PLAINS CITY SCHOOL DISTRICT

To Be Determined

Number and Street Name

White Plains, NY 10605

City , State Zip Code

By _____
(Signature)

By _____
(Signature)

(Printed Name and Title)

(Printed Name and Title)

-FORM OF DISCLOSURE-

THE UNDERSIGNED AFFIRMS THAT THE FOLLOWING CONSTITUTE ALL OFFICERS, DIRECTORS, PARTNERS, OR CONTROLLING PRINCIPALS OF THE FIRM:

Name

Title

1. Does any School District Board Member, administrator, or employee possess any financial interest, directly or indirectly, in the firm?_____ If yes, set forth the basis upon which a financial interest exists in the firm:

2. Has the firm or any of its officers, directors, partners, or controlling principals possessed any interest in transactions heretofore entered into with the School District?_____ If yes, please describe transaction(s):

3. Does any direct relative of a member of the Board, administrators, or staff possess any financial interest, directly or indirectly, in the firm (For purpose of this inquiry a direct relative is to be defined as a parent, spouse, child or sibling)._____If yes, set forth below the School District Board Member, administrator, or staff member whose relation possess an interest and the relationship:

THE UNDERSIGNED AFFIRMS THAT THE ABOVE STATEMENTS ARE TRUE AND UNDERSTANDS THAT ANY FALSE STATEMENT SHALL CONSTITUTE A VIOLATION OF THE PENAL CODE OR GENERAL MUNICIPAL LAW AS APPLICABLE.

Firm: _____

Signature: _____

Print Name: _____

Title: _____

Date: _____

CONTRACTOR CERTIFICATION FORM: LABOR LAW § 220-i
SIGN AND SUBMIT WITH BID

Contractors submitting bids for a municipal public work project must be registered with the New York State Department of Labor ("NYSDOL") ***before*** the submission of a bid. The person authorized to submit this bid on behalf of the prospective bidder hereby certifies, under the penalties of perjury, that: **(1)** the prospective bidder (i.e., contractor) is currently registered with the NYSDOL pursuant to NYS Labor Law § 220-i; and **(2)** each and any subcontractors engaged by contractor for work on this project shall be registered with the NYSDOL pursuant to NYS Labor Law § 220-i prior to commencing work on the project. Certificates of Registration for subcontractors can be submitted with this form but ***must*** be submitted ***before*** such subcontractor(s) commence work on the project. Bidder will be responsible for any project delays caused due to a subcontractor's failure to timely register with the NYSDOL. *Failure to complete this form or to include copies of bidder's current Certificate of Registration may result in disqualification from this bid.*

Bidder hereby represents it has attached to this form, a copy of the Certificate(s) of Registration issued by the NYSDOL for the Bidder.

Project: _____

Bidder's Business Name: _____

Bidder's Address: _____

Bidder's NYSDOL Certificate Number: _____

Issued: _____ Expiration Date: _____

Subcontractor(s) NYSDOL Certificate Number *(if available at time of bid submission)*: _____

☐ Copy of Bidder's NYSDOL Certificate of Registration is attached. A copy of a submitted application will not be accepted.

Date: _____

Signature of Bidder's Authorized Representative

Sworn to before me this _____
day of _____, 20____

Print Name/Title

Notary Public

GENERAL CONDITIONS
of the
CONTRACT for CONSTRUCTION

TABLE OF CONTENTS

ARTICLE 1 - DEFINITIONS	1
ARTICLE 2 – CONTRACTOR’S REPRESENTATIONS	3
ARTICLE 3 – CONTRACTOR’S CONSTRUCTION PROCEDURES	5
ARTICLE 4 – CONTRACTOR’S USE OF SITE.....	12
ARTICLE 5 – SUBCONTRACTORS	20
ARTICLE 6 – CONTRACTOR’S USE OF DRAWINGS/SPECIFICATIONS	22
ARTICLE 7 – CONTRACTOR’S SAFETY/SECURITY PROGRAM	33
ARTICLE 8 – CHANGES IN THE WORK.....	39
ARTICLE 9 – PAYMENTS.....	42
ARTICLE 10 – INSURANCE REQUIREMENTS	50
ARTICLE 11 – REQUIRED BONDS FOR THE PROJECT	53
ARTICLE 12 – INDEMNIFICATION.....	54
ARTICLE 13 – TIME FOR COMPLETION OF WORK.....	56
ARTICLE 14 – DEFICIENT AND INCOMPLETE WORK.....	59
ARTICLE 15 – FINAL COMPLETION AND CLOSEOUT OF THE PROJECT	61
ARTICLE 16 – RELEVANT STATUTORY PROVISIONS	63
ARTICLE 17 – TERMINATION OR SUSPENSION.....	67
ARTICLE 18 – CLAIMS AND DISPUTES	71
ARTICLE 19 – MISCELLANEOUS PROVISIONS.....	72

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

The within document includes detailed provisions concerning the capital improvement work to be performed by the Contractors engaged by the School District. This document contains provisions which relate particularly to capital improvement projects in the school district setting in New York State. The document is incorporated by reference into all contracts to be awarded and should be reviewed carefully by the Contractor to whom the award of contract is made. Consultation with an attorney and insurance representative is advised.

ARTICLE 1 DEFINITIONS

- A. "Addendum" or "Addenda" refers to revised drawings and/or written requirements for the capital improvement work issued by the Architect prior to the time indicated for submission of a bid by a contractor.
- B. "After Hours" refers to the time before or after the hours school is in session. During this time, students and staff may occupy portions of the facility or building, but may be redirected as required to allow for the completion of work by a contractor.
- C. The "Architect" is the design professional engaged by the School District to perform design related functions respecting the capital improvement projects to be performed in the School District.
- D. "Board of Education" refers to the Board of Education of the School District.
- E. "Central Administration" refers to the Superintendent of Schools, his/her Assistant Superintendents, and Director of Plant & Facilities.
- F. The "Construction Manager" is the entity engaged by the School District to act as its representative during the course of construction of the Project.
- G. "Contract Documents" refers to all drawings, sketches, specifications, addenda, field directives and all other written or drawn descriptions of the products, labor and materials to be provided for the Project.
- H. The "Contractor" refers to the entity engaged by the School District to perform all or a part of the capital improvement project on its behalf.
- I. The "Drawings" are the plans, elevations, sections, details, schedules and diagrams developed by the Architect for the capital improvement projects to be performed in accordance with the project manual of which these General Conditions of the Contract for Construction form a part.

J. The "Off Hours" refers to a period of time during which the school facility or building shall be unoccupied, to be a duration of no less than 24 hours.

K. The "Owner" refers to the Board of Education or its designee.

L. The "Project" refers to the entire capital improvement project to be performed in accordance with the project manual and may include work by the Owner.

M. The "Project Manual" is the bound document which is issued simultaneously with the project Drawings and includes the Notice to Bidders, Information to Bidders, Bid Proposal Form, Prevailing Wage Rate schedule and the written requirements for labor, materials, equipment, construction systems and the like necessary for the Contractor to complete the capital improvement work for which it has been engaged.

N. A "Subcontractor" is a person or entity who has a direct contract with the Contractor to provide material and/or labor for the project on or off the site, or to otherwise furnish labor, material or other services with respect to a portion of the Contractor's work. A "Sub-subcontractor" is a person or entity who has a direct or indirect contract with a Subcontractor engaged by the Contractor to perform a portion of the Subcontractor's work at the site, or to otherwise furnish labor, material or other services with respect to a portion of the Subcontractor's work.

O. The term "Specialist" or "Specialty Contractor" as used in these specifications shall mean an individual or firm of established reputation, or, if newly organized, whose personnel have previously established a reputation in the same field, which is regularly engaged in, and which maintains a regular force of workers skilled in either manufacturing or fabricating items required by the Contract, installing items required by the Contract, or otherwise performing work required by the Contract.

P. "Accepted", "directed" "permitted," "requested," "required," and "selected" mean, unless otherwise explained, "accepted by the Architect and/or Owner" "directed by the Architect and/or Owner," "permitted by the Architect and/or Owner," "requested by the Architect and/or Owner," "required by the Architect and/or Owner," and "selected by the Architect and/or Owner." However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.

Q. "As accepted" "or acceptable substitute", and "for review" mean the Architect is the sole judge of the quality and suitability of the proposed substitutions. Where used in conjunction with the Architect's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, the meaning will be held to the limitations of the Architect's responsibilities and duties as stated in the General Conditions. In no case will "accepted by the Architect" be interpreted as an assurance to the Contractor that the requirements of the Contract Documents have been fulfilled.

R. “Furnish” means supply and deliver to the Project site or other designated location, ready for unloading, unpacking, storing, assembly, installation, application, erection, or other form of incorporation into the Project, and maintained ready for use. Supply and deliver products requiring additional or supplemental fitting, assembly, fabrication, or incorporation into other elements of the Project directly to the fabricator, installer or manufacturer as required.

S. “Install” means unload, unpack, use, fit, attach, assemble, apply, place, anchor, erect, finish, cure, protect, clean, and similar operations required to properly incorporate work into the Project.

T. “Provide” means furnish and install.

U. “Replace” means remove designated, damaged, rejected, defective, unacceptable, or non-conforming work from the Project and provide new work meeting the requirements of the Contract Documents in place thereof.

V. “Unusual” refers to means and methods beyond any conventional or generally accepted standard of work or installation, generally requiring a standard of care and protection as outlined by a manufacturer’s guidelines and recommendations.

W. The word “include”, in any form other than “inclusive”, is non-limiting and is not intended to mean 'all-inclusive'.

ARTICLE 2 CONTRACTOR’S REPRESENTATIONS

A. Upon submission of its bid to the Owner, the Contractor expressly represents:

1. The Contractor represents and warrants that it performed a detailed investigation of the site(s) and that such investigation was sufficient to disclose the conditions of the site(s) at which work is to be performed by it and all improvements thereon, and the conditions under which the work is to be performed, including, but not limited to (a) the location, condition, layout and nature of the project site and surrounding areas; (b) the cost of labor, materials and equipment necessary to perform the work, the availability; (c) the areas of the work which will cause a disruption to the necessary and proper operation of the facilities by the Owner; and (d) other pertinent limitations on the performance of its work.

2. The Contractor represents and warrants that it has carefully studied and compared the drawings and pertinent provisions of the project manual and that any errors, omissions, ambiguities, discrepancies or conflicts found in said documents have been brought to the attention of the Architect for clarification prior to the Contractor’s

submission of its bid. If, in the interpretation of Contract Documents, requirements within the Drawings and Specifications conflict, or it appears that the Drawings and Specifications are not in agreement, the requirement to be followed shall be decided by the Architect. Where there is a discrepancy in quantity, the Contractor shall provide the greater quantity; where there is a discrepancy in quality, the Contractor shall provide the superior quality. Addenda supersede the provisions that they amend.

3. Each trade contractor certifies to be experienced and familiar with the requirements and conditions imposed during the construction of similar work in the area. This includes, but is not limited to, the requirement of normal "out of sequence" or "come back" work for the removal of plant, equipment, temporary wiring or plumbing, etc. This "out of sequence" work may also include phasing of construction activities to accommodate the installation of the work at various locations and orderly fashion and the completion of work at various locations and/or levels at various times. This "phasing", "out of sequence", or "come back" work shall be done at no cost to other trade contractors, the Owner, Architect or the Construction Manager.

B. The Contractor warrants to the Owner that (1) the materials and equipment furnished under its contract will be of good quality and new, and of recent manufacture, unless otherwise required or permitted by the Contract Documents, (2) that its work will be free from defects not inherent in the quality required or permitted, and (3) that its work will conform with the terms and conditions of its agreement with the Owner. Work not conforming to these requirements, including substitutions not properly approved and authorized, shall be considered defective and shall be removed and replaced at the Contractor's cost and expense. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

C. Except as to any reported errors, inconsistencies or omissions, and to concealed or unknown conditions, by executing the Agreement, the Contractor represents the following:

1. The drawings and accompanying specifications found in the project manual issued simultaneously with said drawings are sufficiently complete and detailed for the Contractor to (a) perform the work required to produce the results intended by the Owner and (b) comply with all the requirements of its contract with the Owner.

2. The work required to be performed by the contractor including, without limitation, all construction details, construction means, methods, procedures and techniques necessary to perform its work, use of materials, selection of equipment and requirements of product manufacturers are consistent with: (a) good and prevailing and accepted industry standards applicable to its work; (b) requirements of any warranties applicable to its work; and (c) all laws, ordinances, regulations, rules and orders which bear upon the Contractor's performance of its work.

3. The Drawings and Specifications for the Contract have been prepared with

care and are intended to show as clearly as is practicable the work required to be done. Work under all items in the Contract must be carried out to meet field conditions to the satisfaction of the Architect and Owner and in accordance with his instructions and the Contract Drawings and Specifications.

4. All dimensions shown on the Drawings are for bidding purposes only. It is the responsibility of the Contractor to verify all dimensions in the field to insure proper and accurate fit of materials and items to be installed.

D. The representations set forth herein shall survive expiration and/or termination of the Contractor's agreement with the Owner.

ARTICLE 3 CONTRACTOR'S CONSTRUCTION PROCEDURES

A. 1. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures required for the proper execution of its work on the project. Where the drawings and/or project manual make reference to particular construction means, methods, techniques, sequences or procedures or indicate or imply that such are to be used in connection with the Contractor's work, such reference is intended only to indicate that the Contractor's work is to produce at least the quality of the work implied by the operations described, but the actual determination as to whether or not the described operations may be safely or suitably employed in the performance of the Contractor's work shall be the sole responsibility of the Contractor. All loss, damage, liability, or cost of correcting defective work arising from the employment of a specific construction means, method, technique, sequence or procedure shall be borne solely by the Contractor.

2. Neither the Architect nor the Owner will have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility as provided herein.

3. The Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, rigging, water, heat, utilities, light, transportation, and other facilities and services necessary for proper execution and completion of its work, whether temporary or permanent and whether or not incorporated or to be incorporated in its work.

B. The Contractor shall be responsible for coordinating the work of its own forces and the work of subcontractors engaged by it to perform the work of the project on its behalf. The Contractor shall supply to its own work forces and subcontractors engaged by it to perform portions of its work copies of the drawings and project manuals for the work to be performed by such individuals/entities on its behalf. The Contractor shall review any

specified or installation procedure with its employees and/or subcontractors, including those recommended by any product manufacturer, prior to the commencement of the relevant portion of the work to be performed. The Contractor shall be responsible to the Owner for the acts and/or omissions of the Contractor's employees, the Contractor's Subcontractors, the Contractor's material suppliers, and/or their respective agents and employees, and any other persons performing portions of the work on behalf of the Contractor.

C. The Contractor shall be responsible for the inspection of portions of the project performed by its own work force and/or subcontractors engaged by it for the purpose of determining that said work is in proper condition to receive subsequent work.

D. The Contractor shall perform its work in accordance with the standards of the construction industry applicable to work in the locale in which work is to be performed.

E. The Contractor shall only employ labor on the project or in connection with its work capable of working harmoniously with all trades, crafts and any other individuals associated with the capital improvement work to be performed. There shall be no strikes, picketing, work stoppages, slowdowns or other disruptive activity at the project for any reason by anyone employed or engaged by the Contractor to perform its portion of the work. There shall be no lockout at the project by the Contractor. The Contractor shall be responsible for providing the manpower required to proceed with the work under any circumstance. Should it become necessary to create a separate entrance for a contractor involved in a labor dispute, all costs associated with creating that entrance shall be borne by the contractor involved in the dispute. Such costs shall include, but not be limited to, signage, fencing, temporary roads and security personnel as deemed necessary by the Owner for the safety of the occupants of the site.

F. 1. If the Contractor has engaged the services of workers and/or subcontractors who are members of trade unions, the Contractor shall make all necessary arrangements to reconcile, without delay, damage or cost to the Owner and without recourse to the Architect or the Owner, any conflict between its agreement with the Owner and any agreements or regulations of any kind at any time in force among members or councils which regulate or distinguish what activities shall not be included in the work of any particular trade.

2. In case the progress of the capital improvement work to be performed by the Contractor is effected by any undue delay in furnishing or installing any items or materials or equipment required pursuant to its agreement with the Owner because of a conflict involving any such labor agreement or regulation, the Owner may require that other material or equipment of equal kind and quality be provided pursuant to a Change Order or Construction Change Directive but in no case shall the amount of such change be charged by the Contractor to the Owner as an additional cost to perform the capital improvement work pursuant to its contract.

3. The Contractor shall ensure that its work continues uninterrupted during the pendency of a labor dispute.

4. The Contractor shall be liable to the Owner for all damages suffered by the Owner occurring as a result of work stoppages, slowdowns, disputes or strikes.

G. The Contractor shall enforce strict discipline and good order among the Contractor's employees and its Subcontractors' work forces and other persons carrying out the performance of its work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. The Owner reserves the right to object to any person to be hired or who is employed by the Contractor. Upon the request of the Owner, said person shall be removed from the Project and not again be assigned to perform the Contractor's work without the written permission of the Owner.

H. Within one (1) week after a Notice to Proceed is received, the Contractor shall employ a competent, full-time Project Manager and On Site Superintendent to be approved by the Owner or its representative, and such necessary assistants who shall be in attendance at each project site whenever and wherever work is in progress to provide for the expeditious completion of the work. Said Project Manager and On Site Superintendent shall be employed until punchlist and closeout of the Project. To the extent work is being performed contemporaneously at different facilities within the School District, the Contractor shall assign different superintendents for each facility at which work is being performed. The Project Manager and On Site Superintendent assigned by the Contractor shall not be changed except with the consent of Owner, unless the Project Manager or On Site superintendent or such assistant proves to be unsatisfactory to the Contractor and/or ceases to be in its employ. The Project Manager and On Site Superintendent shall represent the Contractor, and communications given to the Project Manager or On Site Superintendent, whether verbal or written, shall be as binding as if given to the Contractor. Oral communications to the superintendent(s) or his/her assistant(s) and/or project manager shall be confirmed in writing by the Owner, or Architect. The Contractor shall forward to the Owner a copy of the resumes for each of its superintendents, project managers and their assistants. The Owner or the Architect shall have the right to have any supervisory or management staff removed from the project with or without cause.

I. Each Contractor shall provide, or otherwise see that, the project manager, or on site superintendent site managers, and/or responsible workers of each Contractor and major subcontractor are equipped with cellular phones and radios. Each Contractor shall provide the Owner and the Architect with the number for each phone and worker.

J. The Contractor's supervisory personnel, including superintendents and their assistants, shall be versed in the English language. In the event the Contractor's supervisory personnel, superintendents and/or their assistants are not versed in the English language, the Contractor shall employ the services of a full-time on-site interpreter

to facilitate communications with such supervisory personnel, superintendents and/or assistants.

K Prior to the commencement of work, the Contractor shall provide the Construction Manager and the Architect with:

1. a written list of the names, addresses and telephone numbers of the members of its organization who can be contacted in the event of an off-hours emergency at the building site, including cellular telephone numbers and personal/home telephone numbers.
2. a written list of subcontractors, sub-subcontractors, suppliers and vendors with names, addresses, telephone numbers, and descriptions of the work they shall perform or furnish.
3. The name, address and telephone number of the bonding company, banking and insurance company for the Prime Contractor employed by the Prime Contractor including the name, address and telephone number of each bonding company's primary contact representative for this project.
4. Detailed subcontractor schedules indicating the approximate quantity of shop drawings, sequence, timing and man loading.
5. A cash flow projection for the life of the project, including a schedule and graph showing the amount of work projected to be completed each month or billing period and a dollar value for the anticipated billings each month or billing period. This shall be completed after an agreed upon schedule of values has been approved by the Construction Manager.

L. 1. Tests, inspections and approvals of portions of the Contractor's work required by the drawings and/or specifications shall be made at an appropriate time. Unless otherwise provided, the Contractor shall consult with the Architect and the Construction Manager concerning the need for testing and/or inspection of its work pursuant to the Contract Documents and, after consulting with the Architect and Construction Manager, the Construction Manager shall advise the Owner to make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority. The Owner shall bear all costs associated with the tests, inspections or approvals required by the drawings and/or specifications except as set forth in subparagraph 3 hereof.

2. Tests, inspections and approval of portions of the Contractor's work required by laws, ordinances, rules, regulations or orders of public authorities or governmental agency having jurisdiction shall be made at an appropriate time. The Contractor shall consult with

the Architect and the Construction Manager concerning the need for testing and/or inspection of its work pursuant to law, ordinance, regulation or orders of public authorities or governmental agencies and shall advise the Owner in writing that it has made arrangements for such tests, inspections and approvals with the appropriate public authority or governmental agency. The Contractor shall be solely responsible for making timely notice of the need for a test, inspection and/or approval with the relevant public authority or governmental agencies and shall bear all costs associated with such testing, inspection or approval required by such public authority or governmental agency.

3. If the Architect, the Construction Manager, the Owner, or public authorities or governmental agencies having jurisdiction determine that portions of the Contractor's work require additional testing, inspection or approval due to the Contractor's failure to perform its work in accordance with the requirements of the Contract Documents and/or laws, ordinances, rules, regulations or orders of public authorities or governmental agencies having jurisdiction, the Architect and the Construction Manager will advise the Owner of the need for such additional inspections or tests and the Owner shall make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner. The Contractor shall bear the costs of such additional testing as provided in Article 14.

M. The Contractor shall, if required by ordinances, laws, codes, rules and/or regulations of the governing agencies having jurisdiction over this project, retain a licensed professional engineer to supervise the construction of this project including, but not limited to, foundations, structural work, soils, welding, reinforced masonry and the like.

N. The Contractor recognizes and acknowledges that the within project is governed by and subject to the provisions of New York State General Municipal Law, section 101, governing the award of contracts on public improvement projects. As such, the Contractor recognizes and acknowledges that other contractors will be performing work on the project in conjunction with it. As such the Contractor agrees to cooperate with such other contractors performing work on the project and shall perform its work as follows:

1. The Contractor shall not interfere with the erection, installation or storage upon the premises of any work, materials, supplies or equipment which is to be performed and furnished by other contractors, and the Contractor shall properly connect and coordinate its work therewith.

2. The Contractor shall not commit or permit any act which will interfere with the performance of the work of any other contractor performing work on the project. If the Contractor sustains any damage through any act or omission of other contractors having a contract with the Owner for the performance of work upon the site or of work which may be necessary to be performed for the proper execution of the work to be performed hereunder, or through any act or omission of a subcontractor of such contractor, the Contractor shall promptly notify the Owner and the Construction Manager of such damage.

3. The Contractor agrees to defend and indemnify Owner, Architect, Construction Manager, Consultants and Sub-consultants, from all claims made against any of them arising out of Contractor's acts or omissions **or** the acts or omissions of any subcontractor of the Contractor which have caused damage to the Owner, Architect, Construction Manager or other contractor(s) on the project. The Owner's right to indemnification hereunder shall in no way be diminished, waived or discharged, or by the exercise of any other remedy provided for by the contract or by law. Further, the Owner shall withhold from an offending contractor's contract sum an amount sufficient to cover such damage and all expenses and costs associated with the damage sustained.

4. When the work of the Contractor or its subcontractors overlap or dovetail with that of other Contractors, materials shall be delivered and operations conducted to carry on the work continuously, in an efficient, workmanlike manner.

5. In case of interference between the operations of different Contractors, the Construction Manager will be the sole judge of the rights of each Contractor and shall have the authority to decide in what manner the work may proceed, and in all cases its decision shall be final. Any decision as to the method and times of conducting the work or the use of space as required in this paragraph shall not be basis of any claim for delay or damages by the Contractor.

6. The Contractor, including its subcontractors, shall keep itself informed of the progress of other contractors and shall notify the Architect or Owner's Representative immediately in writing of lack of progress on the part of other contractors where such delay will interfere with its own operations. Failure of the Contractor to keep informed of the work progressing on the project and failure to give notice of lack of progress by others shall be construed as acceptance by the Contractor of the status of the work as being satisfactory for proper coordination with the Contractor's own work.

7. Delays or oversights on the part of any contractor or subcontractor in getting any or all of their work done in the proper way, thereby causing cutting, removing and replacing work already in place, shall not be the basis for a claim for extra compensation.

8. If part of the Contractor's work depends for proper execution or results upon construction or operations by the Owner or another contractor, the Contractor shall, prior to proceeding with that portion of its work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or other contractor's completed or partially completed construction is fit and proper to receive the Contractor's work.

9. The Contractor shall promptly correct discrepancies or defects in its work which have been identified by other contractors as affecting proper execution and results of the work of such other Contractor.

O. 1. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities or governmental agencies bearing on performance of the Work. If the Contractor fails to give such notices, it shall be liable for and shall indemnify and hold harmless (a) the Owner, its consultants, employees, officers and agents, (b) the Architect and its consultants, employees, officers and agents, and/or (c) the Construction Manager and its consultants, employees, officers and agents against any resulting fines, penalties, judgments, or damages, including reasonable attorney's fees, imposed on or incurred by the parties indemnified hereunder.

2. The Contractor shall pay any costs or fees incurred and any fines or penalties imposed as a result of any violation, including any costs or fees incurred by the Owner due to such violation. If the Contractor observes any discrepancies between portions of the Contract Documents, the Contractor shall promptly notify the Architect and Owner in writing, and necessary changes shall be accomplished by appropriate modification to the drawings and/or specifications.

3. If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Architect and Owner, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs and shall bear the total cost for correction of same.

4. If the Contractor fails to give such notices, it shall be liable for and shall indemnify and hold harmless (1) the Owner, its consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager, its consultants, employees, officers and agents, against any resulting fines, penalties, judgments, or damages, including reasonable attorney's fees, imposed on or incurred by the parties indemnified hereunder. The Contractor shall pay any costs or fees incurred in such compliance and any fines or penalties imposed for violation thereof and any costs or fees incurred by the Owner due to such violation.

P. The Contractor recognizes and acknowledges that job meetings will be held at the job site weekly unless otherwise designated by the Owner or the Architect. The Contractor shall have responsible representation at the MANDATORY weekly job meetings held at the Construction Manager's job office. These meetings will be held to arrange for satisfactory coordination of all trades on the project so as not to impede job progress. Contractors or subcontractors failing to attend job meetings shall be responsible for delays and/or expenses incurred due to coordination difficulty.

Q. The Contractor shall provide copies of its daily construction reports to the Construction Manager's Field Superintendent. These reports shall be submitted no later than 10:00 am the following workday. The daily reports shall provide detailed information concerning the Contractor's activities and operations, including work activities on site and manpower. A "Daily Construction" form is included in these specifications and shall be

used for reporting these activities. In addition, the Contractors are to submit a Two Week Look Ahead schedule for upcoming work. A "Two Week Look Ahead" form is included in these specifications for the Contractor's use.

ARTICLE 4 CONTRACTOR'S USE OF SITE

A. The Contractor shall confine operations at the site to the areas at which construction is to be performed and to such areas permitted by law, ordinances, permits and as set forth in detail in the project manual and drawings forming a part of its contract with the Owner.

B. Five (5) days after receipt of the Notice to Proceed, the Contractor shall provide two (2) copies of a videotaped recording of all existing conditions to the Construction Manager. This taping shall provide a record of all existing buildings, grounds, exterior conditions and interior conditions. The Contractor shall schedule a representative of both the Owner and the Construction Manager to be present at this taping. In the absence of this record, the Contractor shall be responsible for paying the costs associated with any and all repairs in an area where the Contractor is working or has worked, as may be deemed necessary by the Owner or the Construction Manager.

C. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy.

D. General Safety and Security Standards for Construction Projects:

1. All construction materials shall be stored in a safe and secure manner.
2. Fences around construction supplies or debris shall be maintained.
3. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
4. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.
5. The Contractor shall exert utmost care and diligence when working in or near any existing buildings or sitework. The absence of protection around such items shall not excuse the Contractor from its liability to provide protection. Any damage to existing buildings, sitework or facilities shall be repaired and charged to the Contractor responsible for the damage.
6. The Contractor shall be responsible for the removal and replacement of existing ceiling tiles and grid in areas of the existing building where its work is required

and new ceilings are not scheduled for installation. In the event that the existing ceilings are damaged and cannot be replaced to the satisfaction of the Owner, the responsible contractor shall be liable for the costs of replacing in kind, the existing ceilings with new tile and grid.

7. All disconnect and/or tie-in work involving any utilities that would interfere with the ongoing operations of the Owner shall be completed after hours when the facility is not in use. The performance of this work shall be projected on all schedules required to be prepared by the Contractor. Additionally, the Contractor shall give the Construction Manager and the Owner at least forty-eight (48) hours advance notice of its intention to perform this type of work. All overtime and standby personnel necessary to complete these tie-ins shall be the responsibility of the Contractor performing the work.

E. 1. Separation of construction areas from occupied spaces: Construction areas which are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas. Methods of dust and fume control shall include, but not be limited to:

- a. Adequate ventilation;
- b. Wetting down;
- c. Keeping bags of insulating materials, cement, etc., closed.
- d. Controlled mixing of materials under field conditions;
- e. Special attention should be utilized in sawing of insulation and certain acoustical materials and storage of materials.
- f. Job housekeeping must be maintained;
- g. Advising all personnel of hazardous conditions, including supervisors and workers;

Each contractor is responsible for instituting the above policies to insure minimal impact to surrounding occupied areas.

2. A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students or school staff.

3. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.

4. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.

F. 1. Storage space will be allotted to the Contractor by the Owner, to the extent such space, in the sole discretion of the Owner is available. The Contractor shall be responsible for securing appropriate space for its material with the Construction Manager prior to delivery. If insufficient space is available on the site, the Contractor shall provide local off-site storage, storage containers, etc. at its own cost and expense. Should any of the material stored on-site obstruct the progress of any portion of the work or the project, this material shall be removed by the Contractor without reimbursement of cost, from place to place or from the premises, as the Construction Manager may direct.

2. The Contractor shall schedule delivery of materials and equipment to minimize long term storage at the Project, to prevent overcrowding of construction spaces, and to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

3. The Contractor shall deliver materials and equipment to the Project 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 installation. The Contractor shall inspect materials and equipment upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected. The Contractor shall store products to allow for inspection and measurement of quantity or counting of units. The Contractor shall store materials in a manner that will not endanger the Project structure. The Contractor shall store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation. The Contractor shall comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

4. The Contractor shall not unreasonably encumber the site with materials or equipment during the performance of its work. Only materials and equipment which are to be used directly in the performance of the Contractor's work shall be brought to and stored on the premises of the School District. After equipment is no longer required for its work, the Contractor shall promptly remove such equipment from the premises of the School District. The Contractor shall be solely responsible for the protection of construction materials and equipment stored on the premises from weather, theft, damage and all other adversity. The Contractor shall at all times provide the proper housekeeping to minimize potential fire hazards, and shall provide approved spark arresters on all steam engines, internal combustion engines and flues.

5. A construction entrance will be designated for deliveries. A separate entrance will be established for entering and exiting the site only. All deliveries shall be scheduled and coordinated with the Construction Manager and the Owner's Security department. Unexpected or uncoordinated deliveries may be turned away by the Owner or the Construction Manager at the discretion or necessity of the Owner. The Owner's enforcement of this provision shall not be construed by any contractor or subcontractor as the basis for a claim of delay in time or monetary damages alleged to have been incurred as a result of refusal of delivery.

6. The Contractor for General Construction shall provide necessary and required security measures to adequately safeguard the construction site from vandalism and intrusion of unauthorized persons. The Contractor for General Construction shall submit its means and methods of security to the Construction Manager for review and comment. The project site(s) must be secured 24 hours a day, 7 days a week including holidays. The General Construction Contractor's failure to secure the site as required by this paragraph will result in the Owner engaging the services of such necessary personnel so as to provide such security. No notice will be given the Contractor for General Construction of the Owner's intention to engage such security services and all costs and expenses associated with the Owner's security of the site in this regard will be back charged to the Contractor for General Construction. While the Owner may have security guards patrolling the project areas, the function of such security guards is not for the purpose of specifically guarding the Contractor's property or operations of work.

G. The Contractor's right to entry and use of the School District premises arises solely from the permission granted by the Owner pursuant to the agreement between the Contractor and the Owner. This permission shall be deemed to be withdrawn upon the termination of the Contractor's agreement with the Owner.

H. 1. The Contractor shall be required to perform its work with no interruption to the School District's operations, including its administrative and business operations. Any work which will interfere with the School District's operations and/or which is to be performed when the School District's facilities are in operation shall be performed on evenings and weekends. Additionally, the Contractor shall conduct its work in compliance with federal, state, county or local ordinances. All costs incurred by the Owner to make the facilities available during evening and weekends shall be borne by the Contractor. The Owner reserves the right to determine what work will "interfere" with its operations and said determination shall be final.

2. The Contractor may request access to the site during times beyond the work hours permitted. Approval is solely at the discretion of the Owner. If approval is given, the Contractor is responsible for paying all additional costs incurred by the Owner, Architect and the Construction Manager for providing the site to the Contractor during the additional time periods.

3. In the event the Contractor fails to complete all work under this contract by said scheduled dates, the Contractor will not be permitted to perform any work during normal school hours. Such work shall only be performed after school hours, Saturdays, Sundays, holidays or periods when school is unoccupied at no additional cost of any kind to the Owner. In addition to damages incurred by the Owner in connection with the Contractor's delay, the Contractor shall be liable for all costs incurred by the Owner to provide staff, Architect and Construction Manager personnel as required to make facility accessible by Contractor and perform inspections during such off hours.

4. The Owner shall not be responsible for any overtime charges incurred by the Contractor during the course of this project. Any and all costs associated with work which is performed at hours requiring the payment of such overtime by the Contractor to its workers shall be the Contractor's responsibility.

I. Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken.

J. The Contractor shall provide all required temporary access walkways, both interior and exterior, and the like necessary to complete its work. The Contractor shall maintain an unobstructed condition at all entrances and/or exits from present buildings. No equipment, other than equipment with rubber tires, will be allowed on any existing or new pavement, UNLESS THE CONTRACTOR HAS OBTAINED THE PRIOR APPROVAL OF THE CONSTRUCTION MANAGER AND THE PAVEMENT HAS BEEN FIRST PROTECTED WITH PLANKING OR BY OTHER MEANS APPROVED BY THE CONSTRUCTION MANAGER.

K. The Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the premises of the School District without the prior written consent of the Owner, which may be withheld at the sole discretion of the Owner.

L. 1. Without the prior approval of the Owner, the Contractor shall not permit any workers to use any existing School District facilities, including, without limitation, lavatories, toilets, entrances and parking areas other than those designated by the Owner. Employees, vehicles, and equipment of the Contractor and of all others engaged by the Contractor for the performance of its work shall enter onto the premises of the School District for which construction work is to be performed only at those locations designated or approved by the Construction Manager. The parking for construction personnel shall be limited to the designated trailer park area only. Failure to abide by this rule will result in towing of cars at the expense of the contractor who employs the individual.

2. The Contractor shall ensure that its work, at all times, is performed in a manner that affords reasonable access to both vehicles and individuals, to the premises of the School District and all adjacent areas. The Contractors' work shall be performed, to the

fullest extent possible, in such a manner that areas in and around the construction area shall be free from all debris, building materials and equipment likely to cause hazardous conditions, and do not close or obstruct walkways, roadways or other occupied facilities or facilities to be used by the Owner. Without limitation to any other provision of the agreement between the Contractor and the Owner, the Contractor shall use its best efforts to minimize any interference with the occupancy of areas, buildings, entrances, and parking areas in and around the premises at which work is being performed. Free access to fire hydrants and standpipe connections shall be maintained at all times during construction operations, and portable fire extinguishers shall be provided by the Contractor and made conveniently available throughout the construction site.

3. The Construction Manager, in conjunction with the Owner and the Architect, shall designate locations at the site at which the Contractor, its subcontractors and employees may utilize in connection with its work. The Contractor's employees and the employees of the Contractor's Subcontractors and others engaged by the Contractor to perform its work are prohibited from trespassing or leaving any vehicle on any property not assigned by the Owner as set aside for the use of the Contractor. The Contractor's employees and the employees of the Contractor's Subcontractors and others engaged by the Contractor to perform its work are prohibited from leaving any vehicle on any property not assigned by the Owner as set aside for the use of the Contractor. The Contractor's employees and the employees of the Contractor's Subcontractors and other engaged by the Contractor to perform its work are restricted to the immediate area at which work is to be performed. Only persons having official business will be admitted to the construction site. NO COMMUNICATION BETWEEN THE CONTRACTOR, ITS EMPLOYEES, SUBCONTRACTORS' EMPLOYEES, OR OTHERS ENGAGED BY THE CONTRACTOR FOR THE PERFORMANCE OF ITS WORK AND STUDENTS OR STAFF WILL BE PERMITTED.

4. The Contractor, its employees, its Subcontractors and their employees or agents, and all others engaged by the Contractor in connection with the performance of its work are required to wear photographic identification badges at all times. The Contractor shall provide such individuals with said photographic identification badges. These badges shall be worn so as to be readily and easily visible. All workers and representatives of the Contractor, its subcontractors or suppliers shall wear these badges while on school property. The information on these badges shall be as prescribed by the Owner and the Construction Manager. Each person seen without a photo identification badge (or otherwise failing to comply with this requirement in the opinion of the Owner or the Construction Manager) shall be ordered to leave school property. No warnings shall be necessary. The Contractor(s) and their subcontractor(s) employing the offending person(s) shall be solely responsible for making-up and paying for any loss of production or required progress in the Work resulting from this action (including any claims by other Contractors dependent on the work of this Contractor). All parties agree that any action taken to enforce this requirement shall not be construed by any Contractor or its subcontractors or suppliers as the basis for a claim (for either time or money) for delay to the Work or to the Contractor,

its Subcontractors, or Suppliers.

5. Without limitation of any other provision of the agreement between the Owner and Contractor, the Contractor shall use its best efforts to comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the premises of the School District. The Contractor shall immediately notify the Owner in writing if during the performance of its work, the Contractor finds compliance with any portion of such rules and regulations to be impracticable, setting forth the problems of such compliance and suggesting alternative through which the same results intended by such portion of the rules and regulations can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives or require compliance with the existing requirements of the rules and regulations.

M. No drinking of alcoholic beverages, smoking or use of controlled substances is permitted on the grounds. The Contractor shall insure that none of its or its Subcontractors, its employees, agents, and/or consultants report to the site impaired by alcohol or controlled substances. The Contractor bears the responsibility of determining if its, or its subcontractors, employees are in any way impaired and whether the safety of the public, the employees of other Contractors and their Subcontractors, the Owner, Architect, or Construction Manager are jeopardized. Each contractor shall provide drinking water for its own employees.

N. The Contractor's employees, representatives, agents and consultants, and all of its Subcontractors' employees, representatives, agents and consultants at the site are to refrain from using indecent language. All doing so will be removed from the site. Artwork or decoration found on vehicles belonging to Contractor or Subcontractor employees parked on or near the school property which contain indecent language or pictures shall either be covered or removed from the location.

O. The Contractor's employees, representative, agents and consultants, and all of its Subcontractors' employees, representatives, agents and consultants at the site are to wear shirts, long pants and proper footwear.

P. Each contractor shall keep the premises and surrounding area in which it is working free from accumulation of waste materials or rubbish caused by the performance of all of the work being performed on-site and in the buildings. On a daily basis at the conclusion of work on the project, each contractor shall clean the areas in which it has performed work and shall remove all waste, materials, rubbish, its tools, construction equipment, machinery and surplus materials. Each Contractor shall broom sweep all construction areas in which it has performed worked every day. The Construction Manager shall perform an inspection each afternoon to determine that the work areas of the contractors have been properly cleaned. In the event the work areas are not cleaned, the Construction Manager shall advise the offending contractor to provide cleaning as required herein. If any contractor fails to keep the site safe and clean within four (4) hours of being notified by the Construction

Manager, either verbally or in writing, the Construction Manager will have the cleanup work performed and back charged to the offending contractor without further notification to the Contractor. The cost of such cleaning company, together with the cost of any custodial costs of the School District, at prevailing overtime rates plus 15% will be charged to the offending contractor. Notice to field personnel shall be deemed notice to the Contractor.

Q. The Contractor shall provide ventilation of enclosed areas during construction as may be required to permit proper curing and drying out and to prevent excessive humidity, moisture and condensation. Ventilation shall be by natural or artificial means as required by conditions involved.

R. The Contractor shall be responsible for the control of chemical fumes, gases and other contaminants produced by welding, gasoline or diesel engines, roofing, paving, painting, etc. to ensure that they do not enter occupied portions of the building or air intakes.

S. The Contractor shall be responsible to ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured or ventilated in accordance with manufacturers' recommendations before a space can be occupied.

T. From the commencement to the completion of the Project, the Contractor shall keep the parts of the work and the buildings free from accumulation of water no matter what the source or cause of water.

U. 1. The General Contractor shall construct temporary partitions where shown on drawings or where otherwise required for safety of the public or to prevent dust from entering occupied areas. Partitions shall be dust-proof from floor to slab or structure above (if existing condition is a drop in tile ceiling, Contractor shall remove tile and install partition to structure above). In addition to framing and sheetrock, the Contractor shall install fire resistant plastic partitions on the work area side of its work. If an access door is required, an alternating 3 layer plastic system shall be used. The door shall be a standard hollow metal door with lockset and closer. Keys shall be distributed to the Owner's other contractors, the Owner and the Architect.

2. Where a contractor other than the General Contractor is the only contractor scheduled to perform work in a particular area of the site at any given time, the responsibilities allocated to the General Contractor in subdivision 1 of this paragraph U shall be performed by such other contractor.

3. All cutting and welding performed within an occupied building or adjacent to a window or intake vent shall be performed during off hours.

V. 1. The Contractor shall control the safe handling and storage of all welding

materials, acetylene and oxygen tanks, and other equipment required for welding and cutting work at the job site. Such storage shall be in compliance with OSHA regulations.

2. Welding materials and equipment shall be removed promptly from the premises upon completion of the welding and cutting work.

W. The Contractor shall be responsible for all costs incurred by the Owner caused by false security/fire alarms set off by the Contractor. Costs shall include custodial response charges etc.

X. The Contractor shall be responsible for broken glass, and at the completion of the Work shall replace such damaged or broken glass. After damaged or broken glass has been replaced, the Contractor shall remove all labels, wash and polish both sides of all glass. In addition to general broom cleaning, the General Contractor shall perform the following final cleaning for all trades at completion of the Work:

1. Remove temporary protections;
2. Remove marks, stains, fingerprints and other soil or dirt from painted, decorated and natural finished woodwork and other Work;
3. Remove spots, plaster, soil and paint from ceramic tile, marble and other finished materials, and wash or wipe clean;
4. Clean fixtures, cabinet work and equipment, removing stains, paint, dirt and dust, and leave same in undamaged, new condition;
5. Clean aluminum in accordance with recommendations of the manufacturer; and
6. Clean all floors thoroughly in accordance with recommendations of the manufacturer.

ARTICLE 5 SUBCONTRACTORS

A. 1. As soon as practicable after receipt of Letter of Intent to Award, Notice to Proceed or other form of official notice of award of the Contract, but not more than ten (10) days after receipt of official notice of award of the Contract, the Contractor shall furnish the Owner and the Architect, in writing, with (1) the name, trade and subcontract amount for each Subcontractor and (2) the names of all persons or entities proposed as manufacturers of the products identified in the Specifications (including those who are to furnish materials or equipment fabricated to a special design) and, where applicable, the name of the installing Subcontractor. Copies of all Subcontractor contracts, fully executed, are to be provided to the Construction Manager, including but not limited to all addenda, appendices, and/or exhibits including scope of work sheets. All such subcontracts shall be submitted to the Construction Manager within ten (10) days of the Owner's award of the contract to the Contractor.

2. Upon review of the Contractor's list of Subcontractors, the Architect will advise the Contractor in writing stating whether or not the Owner, the Construction Manager or the Architect, after due investigation, accepts or rejects, any proposed Subcontractor. Subcontractors will not be acceptable unless, when requested by the Architect, evidence is furnished that the proposed subcontractor has satisfactorily completed similar subcontracts as contemplated under this prime contract, and has the necessary experience, personnel, equipment, plant, and financial ability to complete the subcontract in accordance with the intent to the Documents. As verification of financial ability, the Owner reserves the right to request and receive up to five (5) years worth of financial statements, bank references, bond/insurance company references and all other information required to assess financial ability.

3. If the Owner, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager and Architect have no objection. No increase in the Contract Sum shall be allowed where a sub-contractor is rejected by the Architect, Construction Manager or Owner who is (1) deemed unqualified to perform the particular work subcontracted by the Contractor, (2) does not have the necessary experience, personnel, equipment, plant and financial ability to complete the subcontract, or (3) has a history of poor performance in work of similar nature. Upon receipt of a rejection of a subcontractor by the Owner, Construction Manager or Architect, the Contractor shall have the right to request a meeting with the Architect, Construction Manager and the Owner to discuss the reasons it believes the subcontractor is qualified to perform the work. Upon review of such reasons, the Owner, Construction Manager or Architect shall re-consider its determination and shall advise the Contractor of its determination upon such review. If the Owner, Construction Manager or Architect still finds that such subcontractor does not meet the requirements above-stated, it shall advise the Contractor. The Owner, Construction Manager or Architect's determination upon such review shall be final and binding on the Contractor and its Subcontractor and the Contractor hereby waives any and all claims it or its subcontractor might have against the Owner, the Construction Manager and/or the Architect concerning the rejection of such Contractor and shall require its subcontractors to execute such similar waiver in its agreement with the Contractor.

4. The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such change.

B. By appropriate agreement, the Contractor shall require each Subcontractor to be bound to the Contractor by terms of the Contractor's agreement with the Owner, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by said agreement, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contractor's agreement with the Owner so that subcontracting thereof will not prejudice such rights, and shall allow the Subcontractor, unless specifically provided

otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by its agreement with the Owner, has against the Owner. However, the Subcontract agreement between the Contractor and Subcontractor shall not provide, nor shall this Agreement be deemed to provide any rights, remedies or redress by the Subcontractor(s) against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors.

C. The Contractor shall promptly notify the Owner, Construction Manager and Architect of any material defaults by any Subcontractors and/or whether it has terminated its agreement with any of its subcontractors for any reason.

D. The Contractor hereby assigns all of its rights in its agreements with its Subcontractor(s) and hereby does assign, transfer and set over to the Owner all of its rights and/or interests in its agreements with its Subcontractor(s), but only in the event of termination of the Contractor's agreement with the Owner pursuant to Article 17, paragraph A of these General Conditions of the Contract for Construction and only to the extent the Owner implements its rights to take such assignment of contract by notifying the Subcontractor in writing of its intention to do so. Such an assignment is subject to the prior rights of the surety, if any, obligated to the Owner pursuant to a performance bond submitted in connection with the Contractor's work.

E. If the Work in connection with a subcontract has been suspended for more than ninety (90) days after termination of the Contract by the Owner and the Owner accepts assignment of such subcontract, the Subcontractor's compensation shall not be adjusted for any increase in direct costs incurred by such Subcontractor as a result of the suspension.

F. It shall be the Contractor's responsibility, when sub-contracting any portion of his work, to arrange or group items of work under particular trades to conform with then prevailing customs of the trade, regardless of the particular Divisions and Sections of the Specifications in which the work is described.

G. All subcontracts must be in writing.

ARTICLE 6

CONTRACTOR'S USE OF DRAWINGS/SPECIFICATIONS

A. The Agreement between the Owner and Contractor, and all documents incorporated therein by reference, including but not limited to, the drawings and project manual shall be signed by the Contractor and the Owner.

B. The intent of the agreement between the Owner and the Contractor is to include all items necessary for the proper execution and completion of the work to be performed by the Contractor. The documents comprising the agreement between the Contractor and the Owner are complementary, and what is required by one shall be as binding as if required by all.

C. 1. In the event of inconsistencies within or between parts of the agreement between the Contractor and the Owner or between the agreement between the Contractor and the Owner and applicable standards, codes and ordinances, the Contractor shall (a) provide the better quality or greater quantity of Work or (b) comply with the more stringent requirement; either or both in accordance with the Architect's interpretation.

2. On the Drawings, given dimensions shall take precedence over scaled measurements and large scale drawings over small scale drawings.

3. Before ordering any materials or performing any of its work, the Contractor and each Subcontractor shall verify measurements at the Project site and shall be responsible for the correctness of such measurements. No extra charge or compensation will be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings. Any difference which may be found shall be submitted to the Architect for resolution before proceeding with the performance of the work.

4. If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for the approval by the Architect before making the change.

5. Drawings, in general, are made to scale, but all working dimensions shall be taken from the figured dimensions or by actual measurements at the job and in no case by scaling. The Contractor shall study and compare all Drawings and verify all figures before laying out or constructing the work and shall be responsible for any and all errors in his work which might have been avoided thereby. Whether or not an error is believed to exist, deviation from the Drawings and the dimensions given thereon shall be made only after approval in writing is obtained from the Architect.

6. In the event addendum (a) are issued and contain changes to the Drawings and/or Specifications, the provisions in the addendum (a) supersede previously issued Drawings and/or Specifications.

D. Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control Contractor in dividing the work among Subcontractor or in establishing the extent of Work to be performed by any trade.

E. Unless otherwise stated in the agreement, words and abbreviations which have well-known technical or construction industry meanings are used in the agreements in accordance with such recognized meanings.

F. The Contractor, and all Subcontractors, shall refer to all of the Drawings, including those showing the work of others performing work in connection with the project,

including but not limited to the General Contractor (if any), the Plumbing Contractor, the Heating, Ventilation, Air Conditioning Contractor, Electrical Contractor and other specialized trades, and to all of the Divisions of the Project Manual, and shall perform all work reasonably inferable therefrom as being necessary to produce the indicated results.

G. All indications or notations on the drawings which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the drawings or project manual. All work mentioned or indicated in the drawings or project manual shall be performed by the Contractor unless it is specifically indicated therein that the work is to be performed by others.

H. The Drawings, Specifications and other documents prepared by the Architect are instruments of the Architect's service through which the Contractor's work is to be performed. The Contractor may retain one contract record set during the course of the project. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect, and unless otherwise indicated the Architect shall be deemed the author of them and will retain all common law, statutory and other reserved rights, in addition to the copyright. All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work.

I. The Drawings, Specifications and other documents prepared by the Architect, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects without the specific written consent of the Owner and Architect. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect appropriate to and for use in the performance of its work pursuant to its agreement with the Owner. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's copyright or other reserved rights.

J. The Owner shall furnish surveys describing physical characteristics of the site, upon written request of the Contractor and to the extent such survey is in existence at the time of said request, legal limitations and utility locations for the project sites. Nothing herein shall be construed as requiring the Owner to generate any document which it does not possess at the time of the request by the Contractor. In the event that the survey provided does not clearly delineate the metes and bounds of the Owner's property, the Contractor shall stop work and immediately notify the Architect, Construction Manager and the Owner. The

Contractor shall NOT proceed with its work until it receives written permission from the Construction Manager and/or the Architect. The Contractor shall be fully responsible for all costs arising from non-compliance with this provision. Any delays associated with this provision shall not serve as a basis for a claim by the Contractor.

K. From the basic data established by the Owner, the General Contractor shall establish reference control points and complete the layout of the work. Each Contractor is responsible for utility markouts as it pertains to the scope of their work and maintain markout during work. Sketch of layout with reference points to be given to Construction Manager and Architect at the time of markout.

L. The Contractor shall be responsible for all measurements that may be required for execution of the work to the exact position and elevation as prescribed in the specifications, shown on the drawings, or as the same may be modified at the direction of the Architect to meet changed conditions.

M. The General Contractor shall be responsible for the establishment of points, wall and partition lines required by the various Prime Contractors and subcontractors in laying out their work.

N. Each Contractor shall furnish such stakes and other required equipment, tools and materials, and all labor as may be required in laying out any part of the work from the base lines and bench marks established by the Owner.

O. 1. The General Construction Contractor shall establish a baseline and benchmark system for each building addition, area of renovation or component using the services of a licensed professional surveyor. The surveyor(s) employed to establish this system or to extend and maintain an existing benchmark system for the work of other trades shall have not less than five years experience in performing construction surveys similar to the work they will perform for this project. The remaining Contractors and their respective subcontractors shall be responsible for extending these lines, levels and grades, and for performing all layout for their own work. The Contractor is solely responsible for any damage or loss due to incorrect extension of lines, level or grades in their layout. The Contractor and its subcontractors shall be responsible for the accuracy with respect to the layout of their work. Any discrepancies or errors in the drawings, perceived by another contractor or subcontractor shall be immediately reported to the Construction Manager. If any corrections are necessary, they shall be executed in accordance with the terms and provisions of these General Conditions.

2. The Contractor and its subcontractors shall be responsible to offset or to protect their markings from anything that may disturb them.

3. Every contractor shall work off the lines and elevations established and maintained as the baseline and benchmark system.

4. Each Contractor is responsible for the accuracy of his own work.

P. The Architect may require that construction work be suspended at any time when location and limit marks established by the Contractor are not reasonably adequate to permit checking completed work or the work in progress.

Q. Except for the basic building permit, the Contractor shall be responsible for securing and maintaining for the life of the project: all permits, P.E. Licenses, connection fees, inspections, etc. applicable to, or customarily secured for the work. This provision includes any permits to be issued in the name of the Contractor required for the work. Originals of all permits are to be issued in the name of the Contractor as required for the work. The Contractor shall furnish the Construction Manager with original copies of all permits prior to the commencement of the work, and shall prominently display a copy of all permits at a location approved by the Construction Manager.

R. The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Architect at once.

S. The exactness of grades, elevations, dimensions, or locations given on any Drawings issued by the Architect, or the work installed by other contracts, is not guaranteed by the Architect or the Owner. The Contractor shall, therefore, satisfy itself as to the accuracy of all grades, elevations, dimensions, utilities and locations. In all cases of interconnection of its Work with existing or other work, it shall verify at the site all dimensions relating to such existing or other work. Any errors due to the Contractor's failure to so verify all such grades, elevations, locations or dimensions shall be promptly rectified by the Contractor without any additional cost to the Owner.

T. 1. The Contractor shall give the Architect timely notice of any additional design drawings, specifications, or instructions required to define its work in greater detail, or to permit the proper progress of its work. To the extent the Architect advises the Contractor that the existing design drawings, specifications and/or instructions given are sufficiently detailed for the Contractor to perform its work, the Architect shall be under no obligation to further clarify or define the work to be performed. In all other circumstances, the Architect shall issue a field order which responds to the request for information.

2. Requests for Information (RFIs) are for requests on clarifications or questions on contract drawings and specifications, not contract terms, scheduling items, or general correspondence, nor, as a means to describe or request approval of alternate construction means, methods or concepts or substitution or materials, systems means and methods. The Contractor shall fill all RFIs out in accordance with the provisions of the Project Manual. Neither the Architect nor the Construction Manager shall fill said forms out on the

Contractor's behalf.

U. The Contractor shall, prior to the start of any portion of the Work:

1. review any specified construction or installation procedures, including those as may be recommended by the proposed manufacturer.
2. advise the Architect if the specified procedure(s) deviates from good construction practice.
3. advise the Architect if following said procedure(s) will affect any warranty, including the contractor's general warranty.
4. advise the Architect of any objections the Contractor may have to the specified procedure(s).
5. propose any alternative procedure(s) which the Contractor will warrant.

V. 1. To the fullest extent possible, the Contractor shall provide products of the same kind, from a single source. When two or more items of same material or equipment are required (pumps, valves, air conditioning units, etc.), they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in the work, except as otherwise indicated. The Contractor shall provide products which are compatible within systems and other connected items. 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.

2. The Contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

3. With respect to sitework materials, all products submitted for use and incorporated into this project shall be on the Approved List of Materials and Equipment published by the NYSDOT Materials Bureau, most recent edition.

4. All products submitted for use and incorporated into this project shall be asbestos free.

W. Equivalents. In the Specifications, one or more kinds, types, brands, or manufacturers or materials are regarded as the required standard of quality and are presumed to be equal. The Contractor may select one of these items or, if the contractor desires to use any kind type, brand, or manufacturer or material other than those named in the specifications, they shall indicate in writing, and prior to award of contract, what kind, type, brand or manufacturer is included in the base bid for the specified item. The Contractor shall follow the submission requirements for substitutions as set forth in Article 6.X below.

X. 1. Substitutions. If the Contractor desires to substitute any kind, type, brand, or manufacturer of material other than those named in the Specifications, the Contractor shall request in writing that it be permitted to make a substitution for the specified manufacturer or materials and shall indicate the following:

- a. For which specified material or equipment the request for substitution is being made;
- b. What kind, type, brand, or manufacturer is sought to be substituted for the specified items;
- c. Written documentation evidencing that the substituted material or equipment meets or exceeds the specifications for materials and/or equipment set forth in the project manual. Such documentation shall include, but not limited to, a full explanation of the proposed substitution, together with a submittal of all supporting data including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, significant qualities of proposed substitution (e.g. performance, weight, size, durability and visual effects), and other like information necessary for a complete evaluation of the substitution. Additionally, the Contractor shall provide material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated. All such data shall be provided to the Architect and Owner at the Contractor's sole expense. The Contractor's written explanation shall also include a list of reasons the substitution is advantageous and necessary, including the benefits to the Owner and the project in the event the substitution is acceptable. Additionally, the Contractor shall submit to the Architect information describing in specific detail how the proposed substituted product differs from the quality and performance required by the base specifications, and such other information as may be required by the Owner or the Architect.
- d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.

e. Samples, where applicable or requested.

f. 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 lack of availability or delays in delivery.

2. By making said requests in conformance with procedures established herein and elsewhere in the Project Manual, the Contractor:

a. Represents that a representative of it has personally investigated the proposed substitute product and has determined that it is equal to or superior in all respects to that specified.

b. Represents that the warranty for the substitution will be the same, or greater than, that applicable to the specified product.

c. Certifies that the cost data is complete and includes all related costs under this contract, including professional services necessary and/or required for the architect and engineers to implement said substitution and waives any and all claims for additional costs related to the substitution which subsequently become apparent.

d. Represents that it will coordinate the installation of the accepted substitute, making all such changes to the drawings effected by the change, including but not limited to the electrical, plumbing, site work and heating and ventilating specifications as may be required for the work to be complete in all respects.

e. An affidavit stating that (1) the proposed substitution conforms and meets all the requirements of the pertinent Specifications and the requirements shown on the Drawings and (2) the Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect; and the proposed substitution will have no effect on the construction schedule.

3. Proposals for substitutions shall be submitted in triplicate to the Architect in sufficient time to allow the Architect no less than fourteen (14) working days of award of contract for review.

4. No substitutions will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated hereinbefore.

5. All proposed substitutions shall be submitted to the Architect within fourteen (14) working days of the award of the contract to the Contractor. *(This provision 6(X)(5) shall not apply to equivalents.)*

Y. 1. Submittal of shop drawings, product data, material safety data sheets, samples or similar submittals shall be in accordance with the provisions of the project manual.

2. The Contractor represents and warrants that all shop drawings have been prepared by persons and entities possessing expertise and experience in the trade for which the shop drawing is prepared and, if required by the Architect or applicable law, by a licensed engineer, job specific, reviewed by Contractor and stamped by the Contractor.

3. If the Contractor elects to perform its work without approvals, such work shall be at the Contractor's own risk and expense.

4. By approving and submitting shop drawings, product data, samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto and has checked and coordinated the information contained within such submittals with the requirements of its work.

5. The Contractor shall not be relieved of responsibility for deviations from requirements of its work by the Architect's approval of shop drawings, product data, samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors and/or omissions in the shop drawings, product data, samples or other of its submittals to the Architect, by the Architect's approval thereof.

6. The Architect shall review, approve, reject or take other appropriate action respecting submittals made by the Contractor as set forth in the Project Manual. The Architect shall check for conformance with information given in the drawings and project manual and the design concept expressed in the agreement between the Owner and the Contractor. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities or for substantiating instructions for installation or performance of equipment or systems designed by the Contractor, all of which remain the responsibility of the Contractor. Further, the Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of construction means, methods, techniques,

sequences or procedures.

The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. When professional certification of performance characteristics of materials, systems or equipment is required by the Contract Documents, the Architect shall be entitled to rely upon such certification to establish that the materials, systems or equipment will meet the performance criteria required by the Contract Documents.

7. Upon the Architect's rejection of the Contractor's shop drawings, product data, samples and/or other documentation submitted by the Contractor to the Architect, the Contractor shall review the rejection and re-submit such shop drawing, product data, sample and or other document in accordance with the Architect's instruction. The Contractor shall direct the Architect's specific attention in writing or on re-submitted shop drawings, product data, samples, or similar submittals, to revision which have been made, including revisions not specifically requested by the Architect. Resubmission of rejected documents shall be performed within ten (10) calendar days. No claim for delay or cost shall be accepted as a result of rejected documents.

8. When professional certification of performance criteria of materials, systems or equipment is required of the Contractor, the Architect shall be entitled to rely in a reasonable and professional fashion upon the accuracy and completeness of such calculations and certifications provided, however, if the Architect, in its reasonable and professional judgment considers it advisable, the Architect shall verify the accuracy and completeness of any and all such calculations and/or certifications. In the event any and all such calculations and/or certifications are found to be inaccurate and/or incomplete by the Architect, the Contractor shall assume full responsibility and bear all costs attributable or related thereto, including, without limitation, the expense of the Architect's additional services associated with the verification of such calculations and/or certifications and the expense of the Architect's additional service made necessary by the failure of such calculations and/or certifications to be accurate or complete.

9. If the Architect is required to review the Contractor's submittal more than twice, the Contractor shall bear the cost and expense associated with such additional review as set forth in the Project Manual.

Z. The Architect will interpret and decide matters concerning performance under and requirements of the drawings and/or technical specifications on written request of the Contractor. Such interpretations may, at the Architect's option, be issued in the form of additional drawings or instructions indicating in greater detail the construction or design of the various parts of the Contractor's work. Such drawings or instructions may be forwarded by the Architect to the Contractor by field order, construction change directive or other notice to the Contractor. The Contractor shall execute the work for which it requested an interpretation in accordance with such additional drawings or instructions

without additional cost or extension of its contract time. After a decision has been rendered by the Architect on a matter for which the Contractor sought the Architect's interpretation of the drawings and/or technical specifications, the Contractor shall proceed with the work as directed by the Architect. Failure to proceed with the work in accordance with the Architect's interpretation may be used as a basis for termination of the Contractor's contract pursuant to Article 17 of these General Conditions.

AA. The Contractor shall maintain at the site one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and the Construction Manager and shall be delivered to the Construction Manager for submittal to the Owner upon the completion of its work.

BB. The Contractor shall maintain at the site, and shall make available to the Owner, Construction Manager and Architect, one record copy of the Drawings (the "Record Drawings") in good order. The Record Drawings shall be prepared and updated during the prosecution of the Contractor's work. The prints for Record Drawing use will be a set of black line prints provided by the Architect to the Contractor at the start of construction. The Contractor shall maintain said set in good condition and shall use colored pencils to mark up said set with "record information" in a legible manner to show: (i) deviations from the Drawings made during construction; (ii) details in the work not previously shown; (iii) changes to existing conditions or existing conditions found to differ from those shown on any existing drawings; (iv) the actual installed position of equipment, piping, conduits, light switches, electric fixtures, circuiting, ducts, dampers, access panels, control valves, drains, openings, and stub-outs, etc.; (v) architectural and/or structural changes in the design; and (vi) such other information as either Owner or Architect may reasonably request. At the completion of the work, Contractor shall transfer all information on record drawings to reproducible drawings with new information clouded and noted. Such drawings shall be stamped with the Contractor's name and "AS-BUILT" in the lower right hand corner. The colored record drawing and the as-built reproducible drawing shall be forwarded to the Construction Manager for delivery to the Owner. Final payment and any retainage shall not be due and owing to Contractor until the Record and/or As Built drawings receive the approval from the Architect and the Owner (and all other closeout requirements are met).

CC. The Contractor shall maintain all approved permit drawings in a manner so as to make them accessible to government inspectors and other authorized agencies. All approved drawings shall be wrapped, marked and delivered to the Owner within sixty (60) days of final completion of the Contractor's work.

DD. Each Prime Contractor shall be furnished, free of charge, 3 copies of the Contract Documents and Project Manuals, including all Addenda. Any and all additional copies will be furnished to the Contractor at the cost of reproduction, postage and handling.

ARTICLE 7

CONTRACTOR'S SAFETY/SECURITY PROGRAM

A. 1. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of its work. Prior to beginning any work, the contractor shall submit a copy of its corporate safety plan to the Owner and the Construction Manager. Two (2) weeks after receipt of the Notice to Proceed, the Contractor shall provide a Site Safety/Logistics Plan to the Construction Manager. The Site Safety/Logistics Plan should minimally include locations of the eight- foot high temporary fence and gates, traffic plans for deliveries and removals, refuse container locations, crane locations, pick locations, boom radius, and lift locations, stockpiles, toilet locations, site water and power locations, and safety. This plan shall also show the location of all staging and storage areas, clearly separating construction and school areas. The logistical information represented by the construction documents shall serve as a minimal guide. Each contractor is required to submit their corporate safety policy within ten (10) days of receipt of the Notice to Proceed. Said policy must minimally meet OSHA standards and define details concerning the maintenance of a safe work environment. The Contractor shall make the participation of its subcontractors in its safety program mandatory. A list of key personnel, with addresses and telephone numbers for emergency purposes shall be forwarded to the Construction Manager and Architect. The Owner and the Construction Manager shall establish a fire coordination procedure and shall forward same to the Contractor for its use during the performance of its work.

2. Effective July 1, 2008, all laborers, workers, and mechanics employed in the performance of the work of this Project shall be certified as having successfully completed a course in construction safety and health approved by the United States Department of Labor's Occupational Safety and Health Administration that is at least ten (10) hours in duration.

The Contractor and its subcontractors shall conduct their operation in accordance with the Safety Guides for Construction as issued by the SED, and, the Contractors' Safety Program.

3. All safety equipment including hard hats and weather protective gear required for the Contractor to perform its work are to be supplied by the Contractor and/or its subcontractors. Within the designated construction areas, the Contractor's employees, superintendents, and/or other agents, and its subcontractors, employees, superintendents, and/or other agents are required to wear hard hats and other required and/or essential safety equipment. Each person seen without a hard hat, or otherwise failing to comply with this requirement, will be ordered to leave the project. No prior warnings will be given by the Owner or Construction Manager and Architect. The Contractor and its subcontractors

shall be solely responsible for making up and paying for any loss of production or required progress resulting from the removal of personnel from the project as set forth herein including any costs incurred by the Owner in connection with the work of other contractors.

4. The Contractor and its subcontractors shall provide blankets and auxiliary fire protection as part of its construction safety program to prevent damage to adjacent work or materials as a result of its welding or burning operations. Additionally, as part of its construction safety program, the Contractor and its subcontractors shall provide a fire watch, with a fire extinguisher, which is acceptable to the Owner and the Construction Manager.

5. The Construction Manager and/or Owner reserve the right to have all operating equipment periodically inspected by an independent inspector whose finding will be binding. The Prime Contractor, at its own expense, must make corrections within two (2) working days of receiving a written report.

6. All flagmen required for deliveries to the site are to be furnished by the Contractor or its Subcontractors responsible for the delivery. Any and all deliveries crossing the site or student traffic areas shall be escorted by flagmen. All flagmen shall wear orange vests.

B. The Contractor shall schedule weekly safety meetings and each of its subcontractors must be properly represented at such meetings. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. The Contractor shall notify the Construction Manager in writing its "OSHA Competent Person Regarding Safety". Said person must be an individual capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Construction Manager and Architect. The Contractor shall take all necessary steps to prevent its employees from disturbing and/or damaging the facility and shall be responsible for preventing the escape of fires set in connection with the construction. The Contractor shall notify its employees and subcontractors of the location of the nearest fire alarm box at all locations where the work is in progress. On a weekly basis, the Contractor shall submit to the Construction Manager and Architect minutes of its safety meetings, which minutes shall include a list of the individuals present at such meetings.

C. The Contractor and each of its subcontractors shall conduct its/their operation in accordance with all applicable laws, regulations and order of local, state and federal governments. The Contractor agrees, in order that the work will be completed with the greatest degree of safety to conform to the requirements of the Occupational Safety and Health Act of 1970 (OSHA) and the Construction Safety Act of 1969, including all standards

and regulations that have been since or shall be promulgated by the governmental authorities which administer such acts.

D. The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

E. The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for surety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

F. The Contractor shall take reasonable precautions for the safety and protection of employees at the project site and other person who may be affected by its work, including but not limited to students, staff, employees and agents of the Owner, the Construction Manager and the Architect.

G. The Contractor shall protect and secure its work and the materials and/or equipment to be utilized in connection with its work, whether stored on or off the site and whether in its care, custody and control or that of its Subcontractors, subcontractors to its subcontractors, or material suppliers.

H. The Contractor shall take all steps necessary to protect all property at or adjacent to the site, including but not limited to trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

I. All delivery vehicles/trucks/machinery/etc. permitted on the site must be equipped with back-up alarms and enter through the designated access points. The Contractor's failure to demonstrate this ability will result in cancellation of delivery or stoppage of work. All delays associated with this cancellation will be the responsibility of the contractor responsible for the work involved.

J. All crane picks, materials delivery, etc. must be coordinated so as not to lift over any occupied area of the building. If absolutely necessary, this work shall be done on off hours to insure the safety of the building occupants. Crane location must approved by the Construction Manager to insure the safety of building occupants.

K. The Owner or Construction Manager reserves the right to have all hoisting equipment periodically inspected by an independent inspector whose findings will be binding. The Contractor, at its own expense, must make corrections cited by the inspector before continuing work. The Owner or Construction Manager will not assume any responsibility for the safe operation of any hoisting equipment by exercising this right. The Contractor and/or its subcontractor(s) shall cooperate with the inspector by allowing time

for the inspection. The Contractor shall be notified twenty four (24) hours prior to the time of the inspection. These inspections do not release the Contractor of its responsibility to provide all engineering, permits and inspections as required by OSHA or the New York State Education Department prior to use of any hoisting equipment.

L. The Construction Manager, the Owner, and/or the Architect will not assume any responsibility for the safe operation of any cranes or equipment by exercising this right. The Contractor and its subcontractors shall cooperate with the inspector by allowing time for inspection. The Contractor will be notified 24 hours prior to the time of the actual inspection. The Contractor is obligated to perform all engineering, obtain permits, and to have all hoisting equipment inspected as required by OSHA, Village, Town, County, State, and Federal regulations as well as any other agency having jurisdiction. Copies of all inspection reports and certificates must be transmitted to Construction Manager as soon as possible.

M. The Contractor shall use the entrances designated on the site logistic plans and drawings for personal vehicles, trucks, equipment, deliveries and the like.

N. All interior temporary partitions and emergency egress barriers (if required) are to be installed on an after hours basis (weekends/school holidays).

O. 1. When use or storage of hazardous materials or equipment or unusual construction methods are necessary to perform its Work, the Contractor shall obtain the Owner and the Construction Manager's consent for the use of such materials, equipment or unusual construction methods. In the event the Owner determines that the use of such hazardous material or equipment or unusual construction methods can be performed by the Contractor with alternative means, methods and/or techniques, the Contractor shall employ such alternate means of prosecuting its work at no additional cost to the Owner.

2. In the event the Owner approves the use or storage of such hazardous materials, equipment or unusual construction methods, the Contractor shall provide for the Owner's and the Construction Manager's use a full set of safety instructions relating to all such materials. Additionally, when the Owner and/or the Construction Manager reviews the use of storage of such hazardous materials, equipment and or unusual construction methods, the Contractor shall exercise the highest degree of care and carry on such activities under supervision of properly qualified personnel.

3. Transportation, storage, and use of explosives shall be in strict accordance with all local, state and federal regulations, statutes, and requirements. All safety precautions as set forth in the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, Inc. shall be observed.

4. The Contractor is responsible for its own storage and personnel trailers at the site. The Contractor will be required to supply man trailers and storage box trailers as

required. All costs related to delivery, construction, protection, power, etc. for said trailers is the responsibility of the contractor utilizing the space. The Owner WILL NOT PROVIDE STORAGE SPACE. The placement of personnel and/or storage trailer will be strictly limited to pre-determined locations. The Contractor shall obtain the written approval of the placement of any trailer or storage box from the Construction Manager.

P. During construction, the General Contractor shall be responsible for maintaining a watertight structure. This shall include additions and existing buildings. The contractor shall be responsible for temporary roofing, tarps and other protection at roofs, cavity walls, etc. Should the contractor fail to provide adequate protection, causing flooding, damage or other disturbance to the existing building, contractor shall be responsible for all costs associated with clean up and repairs. Inasmuch as flooding and damage have safety implications to the general public, clean up and repairs may be made by the Owner without warning to the Contractor. Administration costs incurred by the Owner and Architect will also be back charged to the Contractor. The Contractor, by entering into contract with the Owner agrees to be liable for these costs.

Q. When all or a portion of the Contractor's work is suspended for any reason, the Contractor shall securely fasten down all coverings and protect the work, as necessary, from injury by any cause.

R. 1. The Contractor shall promptly remedy damage and loss to all property of the Owner, or adjacent to the Owner's property (other than damage or loss covered by insurance) caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.

S. Title to all completed or partially completed work at the job site, and to all materials delivered to and stored at said job site which are intended to become a part of the completed work covered by the agreement between the Contractor and the Owner, shall be in the name of the Owner. Notwithstanding the foregoing, and prior to acceptance of the completed work by the Owner, the Contractor shall be liable for all loss of or damage to said completed work, partially completed work, materials furnished by the Contractor, and/or materials or equipment furnished by others, the custody of which has been given to the Contractor, arising from any cause other than those against which the Owner herein undertakes to carry insurance. In the event of loss or damage from cause other than those against which the Owner undertakes to carry insurance, the Contractor shall replace or repair the said work or materials at his own cost and expense, to the complete satisfaction of the Owner, the Construction Manager and the Architect.

T. The Contractor shall promptly report in writing to the Owner, the Architect and the Construction Manager all accidents arising out of or in connection with the Work which cause

death, person injury, or property damage, giving full details and statements or any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner, Construction Manager and the Architect.

U. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss.

V. Any and all fines or citations levied against the Owner, Architect, or Construction Manager due to the failure of the Contractor to comply with regulations of any governing authority, shall be paid for by the Contractor. This shall include any interest or late charges which accrue due to the Contractor's failure to remit payment upon receipt of such levies.

W. The Contractor shall indemnify and hold harmless the Owner, Construction Manager and Architect from any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor or any subcontractor or any person or firm directly or indirectly or indirectly employed by such Contractor, with respect to violations of OSHA requirements, rules and/or regulations.

X. The Contractor acknowledges that the Labor Law of the State of New York, and regulations adopted thereunder, place upon both the Owner and Contractor certain duties and that liability for failure to comply therewith is imposed on both the Owner and Contractor regardless of their respective fault. The Contractor hereby agrees that, as between the Owner and the Contractor, and to the extent permitted by law, the Contractor is solely responsible for compliance with all such laws and regulations imposed for the protection of persons performing the Contract.

Y. The Contractor shall indemnify and hold harmless the Owner, Architect, and Construction Manager, of and from any and all liability for violation of such laws and regulations and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner, Architect or Construction Manager in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor.

Z. The Contractor and its subcontractors shall indemnify and hold harmless the Owner, Construction Manager and Architect from any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor or any subcontractor or any person or firm directly or indirectly employed by such Contractor, for the act and/or omissions of any Contractor or Subcontractor that resulted in an incident and/or accident causing personal injury and/or property damage.

ARTICLE 8

CHANGES IN THE WORK

A. Without invalidating the agreement between the Owner and the Contractor, and without notice to the Contractor's surety, the Owner may, at any time or from time to time, order additions, deletions or revisions in the Contractor's work. Such additions, deletions or revisions will be authorized by field order, change order, or construction change directive.

B. Field Orders are an interpretation of the contract drawings and/or specifications which order minor changes in the Contractor's work which will not result in an increase or decrease in the Contractor's total contract sum. From time to time, the Architect may issue field orders to the Contractor. The work included in such field order shall be performed by the Contractor at no additional cost to the Owner and shall not form the basis for a claim for an extension of time of the Contractor's time to complete its work. Hence, the Contractor shall perform the work included in field orders so as to cause no delay to its work and/or the work of other contractors engaged by the Owner in connection with the project. All field orders shall be given to the Contractor and the Construction Manager by the Architect in writing.

C. 1. When the Owner or Architect in association with the Construction Manager request that the Contractor perform work which is not included in the contract drawings or specifications and which will result in additional cost to the Owner, the Architect shall request that the Contractor submit its proposal for performing such additional work. The Contractor shall submit its proposal to the Construction Manager and Architect for review. The Contractor's proposal shall include a complete itemization of the costs associated with performing its work including labor and materials. All proposals for any work that a Contractor, its subcontractor(s) or subcontractor(s) of subcontractor(s) perform in connection with additional work shall be submitted using the following format and in no event shall the total for overhead and profit on any change order exceed fifteen percent (15%) of the cost of the work.

1.	Materials (Itemized Breakdown) including quantities and cost	
2.	Labor (Itemized Breakdown)	
3.	Subtotal (Add lines 1 and 2)	
4.	Credit for work not required due to additional or changes to the work reflected in the within change order (if any)	
5.	Overhead (10% x line 3)	
6.	Subtotal (Add lines 3 through 5)	
7.	Sub-Contract Work (include itemized breakdown.	

	Sub-Contractor(s) overhead and profit allowed is 10%	
8.	Subtotal (Add lines 6 and 7)	
9.	Profit (5% x line 8)	
10.	Subtotal (add lines 8 and 9)	
11.	Rental Value of Equipment (Itemized Breakdown)	
12.	Actual additional charges for bonds	
13.	TOTAL CHANGE ORDER (Add lines 10, 11 and 12)	

2. All proposals submitted by the Contractor without the itemization indicated herein will be returned to the Contractor for re-submission by the Contractor. For any work performed by the Contractor's own forces, fifteen percent (15%) for overhead and profit will be allowed for labor and material related costs. Costs to which overhead is to be applied shall be limited to cost of labor and materials including the cost of delivery. Under no circumstances shall any change order proposal exceed fifteen percent (15%) of the cost of overhead and profit.

The Contractor shall not be entitled to recover overhead and profit on the rental value of equipment and machinery. "Equipment and machinery" shall not include (1) tools customarily used by the contractor's trade, including but not limited to hand tools, and/or (2) equipment and machinery already on site and being utilized by the Contractor for the original scope of work.

The Contractor shall submit with its change order proposals actual invoices from its insurance broker reflecting actual additional costs associated with the procurement of bonds.

3. The Contractor's subcontractor's proposal for any work it is to perform in connection with the additional work shall only include ten percent (10%) for the subcontractor's overhead and profit including sub-subcontracted work. The Contractor is entitled to five percent (5%) on work performed by its subcontractor in accordance with paragraph C (1) of this Article 8. Costs to which overhead is to be applied shall be limited to cost of labor and materials including the cost of delivery. Under no circumstances shall the Contractor or the Contractor's subcontractor(s) be entitled to be reimbursed for overtime, except when specifically approved by the Owner in writing and not as an Extraordinary Measure as set forth in Article 13, and in such event the Contractor shall be paid for by the Owner on the basis of premium payment.

4. Notwithstanding the foregoing, work which is performed pursuant to an allowance included in the Contractor's base contract, the provisions of Article 9, paragraph B, concerning itemization of such work shall be controlling.

5. a. A change in the Contract Sum shall be accomplished only by a written Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim as defined in Article 18 of these General Conditions to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents. **No**

amount shall be payable by the Owner to the Contractor for performance of work without a written and fully executed Change Order.

b. Upon the Contractor's completion of the change order work, and prior to payment being made to the Contractor for such work, the Contractor shall provide the Owner with the following information:

1. Certified payrolls itemizing the labor actually utilized in connection with the change order work.
2. Copies of invoices from subcontractors supplying work in connection with the change order work.

D. 1. When the Owner or Architect request that portions of the Contractor's work originally included in the contract drawings or specifications be deleted and which will result in a reduction of the Contractor's original contract sum, the Architect shall request that the Contractor submit its proposal for deleting the scope of such work from its contract. The Contractor's proposal shall include a complete itemization of the costs associated with deducting such work including labor and materials and shall be submitted using the format set forth in Article 8, paragraph C(1) of these General Conditions of the Contract for Construction or the schedule of values, whichever is greater. The Contractor shall not be entitled to retain its overhead and/or profit for such work nor shall any of its subcontractors which were to perform the work being deducted from the Contractor's scope of work. Additionally, the Contractor shall reflect the reduced cost of premiums on bonds which are to be supplied herein as a result of such change. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase/decrease with respect to that change.

2. The Owner may in its sole discretion deduct and/or reduce the scope of the Contractor's contract with or without any specific reasons therefor.

E. 1. In the event the Contractor and the Owner cannot agree on the sum by which its contract with the Owner is to be increased or reduced based upon changes to the scope of the work as described in Article 8, the Architect shall issue a construction change directive reflecting the deduction and/or reduction of the scope of the Contractor's contract and the Contractor will (a) in the case of additional work to be performed by the Contractor, perform such additional work in an expeditious manner so as not to delay the work of this or other contractors working at the site, and (b) in the case of work to be deducted from the scope of the Contractor's work, refrain from taking any steps in connection with the work associated with the deduction and/or reduction of the scope of

the Contractor's work. The construction change directive shall include (a) a description of the work being added or deducted from the Contractor's scope of work; (b) the amount the Owner has determined to be the cost associated with the additional work or deduction and/or reduction of the scope of the Contractor's contract until the Owner and the Contractor agree upon the increase or decrease in the Contractor's contract sum, or until a claim filed by the Contractor has been determined; (c) the extent to which the contract time will be adjusted as a result of the change in the scope of work. Any claims must be filed in accordance with the requirements set forth in Article 18 of these General Conditions. Failure to timely file any claim in accordance with requirements set forth therein shall constitute a waiver of such claim.

2. In the event the Contractor and the Owner reach agreement on the amount by which the Contractor's contract sum is to be increased or decreased based upon changes to the scope of the Contractor's work as described in Article 8, the Architect, Owner, Construction Manager and Contractor shall sign a change order reflecting such agreement. The change order shall include (a) the description of the change in the scope of the Contractor's work; (b) the amount of the adjustment to the Contractor's contract sum, if any; and (c) the length of time by which the time to complete the contract will be adjusted, if any. Agreement between the Owner and the Contractor in connection with any change order shall constitute a final settlement of all matters relating to the change in the Contractor's work as reflected in said change order, including but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contractor's contract sum and the construction schedule. All such change orders for which the Owner and the Contractor have reached agreement shall be included as a separate line item in the Contractor's applications for payment as if originally part of the Contractor's agreement with the Owner.

F. Neither the Owner, the Construction Manager nor Architect may issue instructions to the Contractor to change the amount of the Contract, except by properly executed Change Orders. Instructions are issued by the Owner or the Construction Manager through the Architect, to the Contractor. The instructions shall not be carried out by the Contractor prior to a written order in the form of a Change Order, signed by the Owner, Architect and Contractor, authorizing a change in the Contract amount or an adjustment to the Contract Sum. No amount shall be payable by the Owner to the Contractor for performance of work without an executed Change Order.

ARTICLE 9 PAYMENTS

A. 1. Prior to commencing its work on the project and within one (1) week of receipt of a Notice to Proceed, the Contractor shall submit to the Construction Manager and the Architect, a schedule of values which includes the amount of money it has allocated in its bid price for the following items of work which are applicable to the Contractor's work.

Said schedule of values shall include each of the CSI division sections reflected in the specifications and applicable to the contract for which the Contractor has been awarded the contract, together with the requirements for bonds/insurance (based upon actual invoice amount), general conditions, meeting attendance and meeting documentation (at least two (2) percent of the contract sum), shop drawing/product data/sample submissions (at least one (1) percent of contract sum), labor and materials on line items as applicable, temporary utilities and services, HVAC balance reports, coordination drawings, punchlist (at least one (1) percent of the contract sum), warranties/guarantees and close out of the project (at least three (3) percent of the contract sum), and allowance, where applicable.

2. Any schedule of values which fails to include sufficient detail, is unbalanced or exhibits "front loading" of the value of the Contractor's work will be rejected. Furthermore, if the schedule of values has been approved by the Construction Manager and the Architect and is subsequently used, but later is found by the Construction Manager or Architect to be improper for any reason, sufficient funds shall be withheld from the Contractors' future applications for payment to ensure an adequate reserve (exclusive of normal retainage) to complete the Contractor's work.

3. The schedule of values shall be drafted so as to reflect multiple construction sites, multiple locations within each site, additions versus renovations of work, and the like so as to satisfy any New York State Education Department requirements for the project.

4. The Schedule of Values prepared by the Contractor must be approved by the Construction Manager and the Architect prior to the payment of any sums due the Contractor.

B. The Contractor shall include in its contract sum all allowances stated in the specifications. However, the Contractor's costs for unloading and handling at the site, overhead, profit and other expenses contemplated for the stated allowance amounts shall be included in its contract sum and not in the allowances.

C. The Contractor shall submit its applications for payment to the Construction Manager and the Architect on a periodic basis. The form to be used by the Contractor shall be AIA 702/CMA and 703/CMA approved by the Construction Manager, the Architect and the Owner for use in connection with the Contractor's work. The form shall be divided in sufficiently in the same form as the Contractor's schedule of values and shall reflect in separate line items for the work:

1. Total value of the work listing labor and material separately
2. Percentage of work completed at the time of submission of the application for payment
3. Value of the work completed at the time of submission of the application for payment
4. Percent of previous amount billed

5. Previous amount billed
6. Current percent completed;
7. Value of work completed to date
8. Percent remaining to be completed by the Contractor; and
9. Value of work remaining to be completed by the Contractor

D. 1. Payments to the Contractor shall be based upon materials and equipment delivered and suitably stored at the site and/or incorporated into the Contractor's work, together with the labor utilized by the Contractor in connection with its work. The Contractor may be paid for materials and/or equipment which has been delivered to the Owner's facilities but which, at the time of submission of its application for payment, has not yet been incorporated into the Contractor's work upon such conditions and requirements as the Owner, the Construction Manager and/or the Architect may advise the Contractor it must satisfy.

2. The Construction Manager and Architect shall review the application for payment submitted by the Contractor and shall advise the Contractor of any adjustments to be made thereto. The Construction Manager and/or the Architect may make such adjustments under the following circumstances:

- a. the Contractor's failure to remedy defective work;
- b. the filing of third party claims or reasonable evidence that there is a probability that such claims will be filed;
- c. receipt by the Owner of a notice of withholding from the New York State Department of Labor or other administrative agencies having jurisdiction over the project;
- d. the Contractor's failure to make proper payments to its subcontractors or material suppliers for labor, materials and/or equipment;
- e. reasonable evidence that the Contractor will not complete its work for the unpaid balance of the remaining monies on its contract;
- f. damages caused to the Owner, Construction Manager, the Architect or another contractor as a result of the Contractor's performance of its work;
- g. reasonable evidence that the Contractor will not complete its work in accordance with its agreement with the Owner, and/or that the remaining monies available on the Contractor's contract will not be sufficient to cover actual or liquidated damages for the anticipated delay;
- h. the Contractor's failure to carry out its work in accordance with the contract drawings and/or specifications;
- i. the Contractor's failure to notify the Architect of errors or inconsistencies between and among the contract drawings and specifications;
- j. the Contractor's and/or its subcontractors' failure to comply with the requirements for maintaining record drawings;
- k. the Architect's and/or the Construction Manager's discovery or observation of work which has been previously paid for by the Owner which is defective

and/or incomplete;

- l. such other acts and/or omissions by the Contractor in connection with the performance of its work.
- m. The amount requested exceeds the percent completion of work on the site.

3. After any such adjustments are made to the Contractor's application for payment, the Contractor shall submit four (4) copies of the final draft of its application for payment to the Construction Manager and Architect, which shall be accompanied by the following documentation:

- a. a current Contractor's lien waiver and duly executed and acknowledged sworn statement showing all Subcontractors and material suppliers with whom the Contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for any Subcontractor and material suppliers in the requested progress payment and the amount to be paid to the Contractor from such progress payment, together with similar sworn statements from all such Subcontractors and material suppliers;
- b. duly executed waivers of public improvement liens from all Subcontractors and material suppliers and lower tiered Subcontractors or material suppliers establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or persons in any previous Application for Payment; and AIA Form G706 or G706A.
- c. Certified payroll for employees of the Contractor and employees of subcontractors performing work on the Project.
- d. Copies of invoices submitted to the Contractor by its subcontractors and/or material suppliers.
- e. Such other information which the Owner, Construction Manager and/or the Architect request the Contractor furnish in connection with its application for payment.

4. Upon submission of its application for payment, the Contractor represents that it is entitled to payment in the amount for which it seeks payment.

5. The Owner shall make payment to the Contractor within forty-five days of receipt of the Contractor's requisition of payment unless such requisition of payment is not in accordance with the terms of the Construction Documents.

6. Upon receipt of payment by the Owner, the Contractor shall promptly make

payment to each of its subcontractors and/or material suppliers for which it has received payment from the Owner. This provision does not obligate the Architect, the Construction Manager and/or the Owner to ensure payment to the Contractor's subcontractors and/or material suppliers.

7. a. In the event a subcontractor and/or material supplier files with the Owner a public improvement lien, the Owner shall withhold payment on previously certified applications for payment which have not yet been paid or subsequent applications for payment submitted by the Contractor an amount equal to 150% of the amount set forth in such public improvement lien. This provision is in addition to and does not supersede the indemnity provisions set forth in Article 12 of these General Conditions.

b. The Owner may release any payment withheld due to the filing of a public improvement lien if the Contractor obtains security acceptable to the Owner or a lien bond which is : (1) issued by a surety acceptable to the Owner, (2) in form and substance satisfactory to the Owner, and (3) in an amount not less the 150% of such lien claim. The cost of the premiums for any such bond posted shall be borne solely by the Contractor. By posting a lien bond or other acceptable security, however, the Contractor shall not be relieved of its obligations pursuant to these General Conditions, including but not limited to the indemnity provisions set forth in Article 12 of these General Conditions.

E. 1. The Contractor shall not be entitled to payment for materials and/or equipment stored off the site unless previously approved in writing by the Owner, Architect, and/or the Construction Manager and upon the Contractor meeting any and all conditions which the Owner, the Architect and/or Construction Manager may impose in connection with such materials and/or equipment, including but not limited to insurance for such materials and cost of storage and transportation associated with such materials and/or equipment. No payment will be made for "commodity type" stored materials such as block, studs, sheetrock, roofing, insulation, piping, fittings, conduit work, etc.

2. In connection with materials and/or equipment stored off the project site, the Contractor must submit with its application for payment the following information:

- a. Type of material must be specifically identified by the Contractor;
- b. The Contractor must furnish an invoice from its supplier showing the total value of material and/or equipment being stored off site and must provide the bill of lading for such material and/or equipment;
- c. The Contractor must provide a Certificate of Insurance in a form approved by the Owner for the full value of the item plus 10%.
- d. The Contractor must execute a security agreement, together with an executed UCC-1 form;

- e. The materials must be stored in a bonded warehouse;
- f. The Contractor must furnish a bill of sale for stored material and/or equipment;

The Contractor still has liability for all materials whether paid or not until installed.

3. Any and all materials and/or equipment for which the Contractor has been paid shall be titled in the Owner upon installation by the Contractor and shall be stored in a bonded facility. For payment to be made to the Contractor, the Contractor must provide the Owner with a waiver of lien and general release from its supplier in connection with its provisions of such materials and/or equipment. Notwithstanding payment by the Owner, any and all warranties and/or guarantees required by this agreement shall not begin to run until the Contractor has completed all of its work.

4. Prior to payment by the Owner, the Contractor may be required to provide the Architect and the Construction Manager with an opportunity to visually inspect the materials and/or equipment for the purpose of determining that such materials are in fact in storage, are the materials specified for the Contractor's work and for any other purpose which the Owner, Construction Manager and/or Architect deem necessary for payment to be made to the Contractor.

F. If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to its agreement with the Owner, including but not limited to these General Conditions of the Contract for Construction, such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained herein to the contrary, if the Contractor fails to promptly make any payment due the Owner, or the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to: (1) deduct an amount equal to that which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (2) issue a written notice to the Contractor reducing the Contractor's contract sum by an amount equal to that which the Owner is entitled.

G. The Contractor may not assign any monies due or to become due to it pursuant to its agreement with the Owner without the Owner's written consent. Any such assignment shall be in a form acceptable to the Owner. If the Contractor attempts to make such an assignment without such consent from the Owner, the Contractor shall nevertheless remain legally responsible for all obligations under its agreement with the Owner.

H. Progress payments and all other payments shall be made in accordance with Section 106 (b) of the General Municipal Law.

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I. At the same time the Contractor submits its insurance certificate to the Owner and the Construction Manager, it shall also submit to the Construction Manager the labor rates of each category of labor for which it and/or its subcontractors shall employ (either directly or indirectly). This information shall be itemized in the format shown below:

Contractor's Name					
Contractor's Address					
Contractor's Office Phone No.					
Contractor's Fax No.					
Contractor's Email Address					
Labor Rate Breakdown					
Worker's Title		Journeyman	1.5 Rate	Foreman	1.5 Rate
Base Hourly Rate					
Payroll Tax & Insurance:	% Per Hr.				
FICA					
Federal Unemployment					
State					
Workers Compensation					
Disability					
Other (Explanation Required)					
Subtotal					
Benefits:	\$ Per Hr.				
Vacation					
Health & Welfare					
Pension					
Annuity					
401(k) Fund					
Other (Explanation Required)					
Other (Explanation Required)					
Subtotal					
Hourly Labor Rate					

**ARTICLE 10
INSURANCE REQUIREMENTS**

A. The Contractor, at its sole cost and expense, shall provide the Owner with the following insurance coverage whether the operations to be covered thereby are through the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

1. **Workers' Compensation and New York State Disability Insurance**
Statutory Workers Compensation (C-105.2 or U-26.3) and New York State Disability Insurance (DB-120.1) for all employees. Proof of coverage must be on the approved specific form as required by the New York State Workers' Compensation Board. ACORD certificates are not acceptable. A person seeking an exemption must file a CE-200 Form with the state.
Extensions Voluntary compensation
 All states coverage employers
 Employer's liability - unlimited
2. **Commercial General Liability Insurance**
\$1,000,000 per Occurrence
\$2,000,000 General Aggregate on per project basis
\$2,000,000 Products and Completed Operations
\$1,000,000 Personal & Advertising Injury
\$100,000 Fire Damage (any one fire)
\$10,000.00 Medical Expenses (any one person)
3. **Owners Contractors Protective (OCP) Insurance**
\$2,000,000 per occurrence, \$4,000,000 aggregate with the Owner as the Named Insured and there will be no additional insureds on OCP policies.
4. **Automobile Liability**
\$1,000,000.00 combined single limit per accident for all vehicles (owned, hired, borrowed or non-owned)
5. **Umbrella/Excess Insurance**
Coverage in all instances shall be on a follow-form basis or provide broader coverage than the general liability insurance and the automobile liability insurance. The insurance coverage shall apply on a per project basis.

<u>Amount of Prime Contract</u>	<u>Amount of Umbrella/Excess Insurance</u>
less than or equal to \$5,000,000	\$5,000,000
\$5,000,0001 to \$6,000,000	\$6,000,000
\$6,000,0001 to \$7,000,000	\$7,000,000
\$7,000,0001 to \$8,000,000	\$8,000,000

<u>Amount of Prime Contract</u>	<u>Amount of Umbrella/Excess Insurance</u>
\$8,000,0001 to \$9,000,000	\$9,000,000
Greater than or equal to \$9,000,001	\$10,000,000

6. **Testing Company Errors and Omission Insurance**

\$1,000,000 per occurrence/\$2,000,000 aggregate for the testing and other professional acts of the Contractor performed under the contract with the Owner. If written on a "claims-made" basis, the retroactive date must pre-date the inception of the contract or agreement. Coverage shall remain in effect for two years following the completion of the work. The testing company shall also provide proof of Workers' Compensation and NY State Disability Benefits Insurance, Commercial General Liability and Excess Liability with limits of \$2,000,000 each occurrence and in the aggregate on a per project basis.

7. **Additional Insurance when the project requires the removal of asbestos, lead and/or other hazardous materials**

Asbestos/Lead Abatement/Pollution Liability Insurance

\$2,000,000 per occurrence/\$2,000,000 aggregate on a per project basis, including products and completed operations. Such insurance shall include coverage for the Contractor's operations including, but not limited to, removal, replacement enclosure, encapsulation and/or disposal of asbestos or any other hazardous material, along with any related pollution events, including coverage for third-party liability claims for bodily injury, property damage and clean-up costs. If a retroactive date is used, it shall pre-date the inception of the Contract. If the Contractor is using motor vehicles for transporting hazardous materials, the Contractor shall obtain and maintain pollution liability broadened coverage (ISO endorsement CA 9948 or CA 0112) as well as proof of MCS 90. Coverage shall fulfill all requirements of this Article 10 and shall extend for a period of three (3) years following acceptance by the Owner of the Certificate of Completion.

B. The coverages required pursuant to paragraph A of this Article 10 shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment.

C. The insurance required to be procured by the Contractor pursuant to paragraph A of this Article 10 shall be purchased from and maintained by insurance carriers licensed to do business and admitted to issue the type of insurance provided in the State of New York, with an A.M. Best rating of "A-" or better.

D. The Contractor must submit the Certificate of Insurance to the Architect or Construction Manager for the Owner's approval prior to the commencement of any work. The failure of the Owner to object to the contents of a certificate of insurance or the absence of same shall not be deemed a waiver of any rights held by the Owner.

E. All insurance coverage to be provided by the Contractor pursuant to paragraph A of this Article 10 shall include a cancellation notice to the Owner of at least thirty days.

F. The Contractor agrees to effectuate the naming of the Owner, the Construction Manager and the Architect as additional insureds on the policies providing the insurance coverage described in paragraph A of this Article 10, except for Workers' Compensation and New York State Disability Insurance. Additionally, the insurance coverage to be provided by the Contractor pursuant to paragraph A of this Article 10 shall state that the Contractor's coverage shall be the primary and non-contributory coverage for the Owner and the Owner's Board of Education, employees and volunteers including a waiver of subrogation in favor of the Owner for all coverages including Workers' Compensation.

G. Additional insured status for General Liability coverage shall be provided by standard or other endorsements that extend coverage to the Owner for on-going operations (CG 20 38 or equivalent) and products and completed operations (CG 20 37 or equivalent). A completed copy of the additional insured endorsements must be attached to the Certificate(s) of Insurance that include General Liability, Auto Liability and Umbrella/Excess coverages together with a copy of the declaration page of the General Liability, Auto Liability and Umbrella/Excess policies with a list of endorsements and forms.

H. Each Certificate of Insurance must describe the services provided by the Contractor (e.g., roofing, carpentry, plumbing) that are covered by the liability policies.

I. At the Owner's request, the Contractor shall provide a copy of the policy endorsements and forms for the policies listed in paragraph A of this Article 10.

J. There will be no coverage restrictions and/or exclusions involving the New York State Labor Law or gravity related injuries. No policies containing escape clauses or exclusions contrary to the Owner's interest will be accepted.

K. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/15) must be included with the certificates of insurance. For any "yes" answers on Items G through L on this form, additional details must be provided in writing. Policy exclusions may not be accepted.

L. In the event that any of the insurance coverage to be provided by the Contractor to the Owner contains a deductible or self-insured retention, or the insurance provided by the Owner contains a deductible, the Contractor shall indemnify and hold the Owner, the Architect and the Construction Manager harmless from the payment of such deductible or self-insured retention, which deductible and self-insured retention shall in all circumstances remain the sole obligation and expense of the Contractor.

M. The Contractor acknowledges that its failure to obtain or keep current the insurance coverage required by paragraph A of this Article 10 shall constitute a material breach of contract and subjects the Contractor to liability for damages, including but not limited to

direct, indirect, consequential, special and such other damages the Owner sustains as a result of such breach. In addition, the Contractor shall be responsible for the indemnification to the Owner, Architect and Construction Manager, of any and all costs associated with such lapse in coverage, including but not limited to reasonable attorney's fees.

N. The Contractor shall require all subcontractors to obtain and maintain the same types of insurance with the same limits of coverage and same additional insureds as set forth in paragraph A of this Article 10 and the subcontractors policies must comply with all the requirements set forth in this Article 10. Contractor shall confirm each subcontractors compliance with the insurance requirements of this Article 10 and collect proof of each subcontractor's insurance prior to the start of any work by the subcontractor. In the event a subcontractor fails to obtain the required insurance and a claim is made or suffered, the Contractor shall indemnify, defend, and hold harmless the Owner, Architect, Engineers, Construction Manager, Consultants, and Sub-consultants and their agents or employees from any and all claims for which the required insurance would have provided coverage. This indemnity obligation is in addition to any other indemnity obligation provided in the Contract Documents.

O. The Contractor assumes responsibility for all injury or destruction of the Contractor's materials, tools, machinery, equipment, appliances, shoring, scaffolding, false and form work, and personal property of Contractor's employees from whatever cause arises. Any policy of insurance secured covering such items that the Contractor or Subcontractors leased or hired and any policy of insurance covering the Contractor or Subcontractors against physical loss or damage to such property shall include an endorsement waiving the right of subrogation against the Owner for any loss or damage to such property.

P. The Owner in good faith may adjust and settle a loss with the Contractor's insurance carrier.

Q. Before commencement of its work, the Contractor shall obtain and pay for such insurance as may be required to comply with the indemnification and hold harmless provisions outlined under Article 12 of these General Conditions of the Contract for Construction.

R. Review and acknowledgment of the Certificate of Insurance by the Owner, Construction Manager or the Architect shall not relieve or decrease the liability of the Contractor hereunder.

S. If the terms of policies expire, or the lives of the insurance companies terminate, before the Contract is completed or during the period of completed operations coverage, and the Contractor fails to maintain continuance of such insurance, the Owner is entitled to provide protection for itself, to pay premiums, and to charge the cost to the Contractor.

ARTICLE 11 REQUIRED BONDS FOR THE PROJECT

- A. The Contractor shall furnish a Performance Bond and Labor and Material Payment Bond meeting all statutory requirements of the State of New York.
- B. All Surety companies are subject to the approval of the Owner and may be rejected by the Owner without cause.
- C. Except as otherwise required by statute, the form and substance of such bonds shall be satisfactory to the Owner in the Owner's sole judgment.
- D. Bonds shall be executed by a responsible surety licensed to do business in New York with an A.M. Best Rating of "A-" or better as to Policy Holder Ratings, and "VII" or better as to "Financial Size Category." Such bonds shall remain in effect for a period not less than two (2) years following final completion of the work by the Contractor.
- E. Bonds shall further be executed by a surety that is currently listed on the U.S. Treasury Department Circular 570 entitled "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies," as amended.
- F. The Performance Bond and the Labor and Material Payment Bond shall each be in an amount equal to 100% of the Contract Sum. The value of each bond shall be adjusted during the Project construction period to reflect changes in the Contract Sum.
- G. Every Bond must display the Surety's Bond Number.
- H. Each bond must be accompanied by an original Power of Attorney, giving the names of Attorneys-in-fact, and the extent of their bonding capacity.
- I. A rider including the following provisions shall be attached to each Bond:
1. Surety hereby agrees that it consents to and waives notice of any addition, alteration, omission, change, or other modification of the Contract Documents. Such addition, alteration, change, extension of time, or other modification of the Contract Documents, or a forbearance on the part of either the Owner or the Contractor to the other, shall not release the Surety of its obligations hereunder and notice to the Surety of such matters is hereby waived.
 2. Surety further agrees that in event of any default by the Owner in the performance of the Owner's obligations to the Contractor under the Contract, the Contractor or Surety shall cause written notice of such default (specifying

said default in detail) to be given to the Owner, and the Owner shall have thirty (30) days from time after receipt of such notice within which to cure such default, or such additional reasonable period of time as may be required if the nature of such default is such that it cannot be cured within thirty (30) days. Such Notice of Default shall be sent by certified or registered U.S. Mail, return receipt requested, first class postage prepaid, to Lender and the Owner.

J. The Contractor shall deliver the required bonds to the Owner prior to beginning construction activity at the site, but no later than 10 days of issue date of Notice of Award of Contract. Said bonds shall be in the form set forth in the Project Manual. No work shall be performed by the Contractor until such bonds have been reviewed and approved.

K. The Owner may, in the Owner's sole discretion and without prior notice to the Contractor, inform surety of the progress of the Contractor's work and obtain consents as necessary to protect the Owner's rights, interest, privileges and benefits under and pursuant to any bond issued in connection with the Contractor's work.

L. If the surety on any Bond furnished by Contractor is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of this Article, the Contractor shall within ten (10) days thereafter substitute another Performance and Payment Bond and surety, both of which must be acceptable to the Owner.

ARTICLE 12 INDEMNIFICATION

A. The Contractor and its subcontractors shall indemnify and hold harmless the Owner, Architect, and Construction Manager, and all their employees, agents or servants or any third parties from and against any and all claims, damages, losses, suits, obligations, fines, penalties, costs, charges and expenses, including but not limited to attorneys' fees, which may be imposed upon or incurred by or asserted against any of them by reason of any act or omission of such Contractor or any of its subcontractors or any person or firm directly or indirectly employed by such Contractor, for the act(s) and/or omission(s) of any Contractor or Subcontractor in connection with the work of the Project.

B. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, Construction Manager and agents and employees of any of them from and against claims, damages, losses and expenses including but not limited to attorneys' fees, arising out of or resulting from performance of its work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction, of tangible property including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed

by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph

B. The Contractor's indemnity obligations under this Paragraph B shall, but not by way of limitation, specifically include all claims and judgments which may be made against the Owner, the Architect, the Architect's consultants and agents and employees of any of them under any applicable statute, rule or regulation including the New York Statute, Occupational Safety and Hazardous Act, and the Federal Occupational Safety and Hazardous Act. In claims against any person or entity indemnified under this Paragraph B by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Paragraph B shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

C. The Contractor shall be liable for and shall indemnify and hold harmless (1) the Owner, its consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager, its consultants, employees, officers and agents, against any fines, penalties, judgments, or damages, including reasonable attorney's fees, imposed on or incurred by the parties indemnified hereunder which are incurred as a result of the Contractor's failure to give the notices of these General Conditions of the Contract for Construction.

D. The Contractor shall indemnify and hold harmless (1) the Owner, its consultants, employees, officers and agents, (2) the Architect and its consultants, employees, officers and agents, and (3) the Construction Manager, its consultants, employees, officers and agents, against any actions, lawsuits or proceedings or claims of liens brought against each or any of them as a result of liens filed against the Contractor's project funds, including all the cost and expense of said liens, and including but not limited to attorneys' fees incurred by each or any of them.

E. The Contractor shall indemnify and hold harmless the Owner, the Architect and the Construction Manager of and from any and all liability for violation of any laws and regulations applicable to the Contractor's work and shall defend any claims or actions which may be brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor.

F. The Contractor shall indemnify and hold harmless the Owner and the Architect of and from any and all liability for claims made by third parties, including subcontractors, in connection with this Agreement and shall defend any claims or actions which may be

brought against the Owner as the result thereof. In the event that the Contractor shall fail to refuse to defend any such action, the Contractor shall be liable to the Owner for all costs of the Owner in defending such claim or action and all costs of the Owner, including attorney's fees, in recovering such defense costs from the Contractor.

ARTICLE 13 TIME FOR COMPLETION OF WORK

A. The date of commencement of the Contractor's work shall be as indicated in the agreement between the Contractor and the Owner. The date shall not be postponed or extended by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible to act. Time limits stated in the agreement between the Owner and the Contractor are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

B. The Contractor shall not commence work on the site until two certified copies of all insurance policies and bonds required by Article 10 and Article 11 of these General Conditions of the Contract for Construction are provided to the Owner and accepted by the Owner. The date of commencement and/or completion of the Contractor's work shall not be changed by the effective date of such insurance. The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the acceptance of the insurance and bonds required by Article 10 and Article 11 of these General Conditions.

C. The Contractor shall proceed expeditiously with adequate forces and shall achieve substantial completion of its contract in accordance with the schedule set forth in its agreement. The Contractor shall cooperate with the Owner, Architect, Construction Manager, and other Contractors on the Project, making every reasonable effort to reduce the contract time.

D. 1. In the event the Owner determines that the performance of the Contractor's work, as of a milestone date, has not progressed or reached the level of completion required by its contract, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, and facilities and (3) other similar measures (hereinafter referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the Contractor progresses its work in compliance with the stage of completion required by its agreement with the Owner. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule.

2. The Contractor shall not be entitled to an adjustment in its contract sum in connection with Extraordinary Measures ordered by the Owner under or pursuant to this Paragraph D.

3. The Owner may exercise the rights furnished the Owner under or pursuant to this Paragraph D as frequently as the Owner deems necessary to ensure that the Contractor's performance of its work will comply with any Milestone Date or completion date set forth in the Contractor's agreement with it.

4. The Owner reserves the right to withhold payment from the Contractor until such time as the Contractor submits a daily schedule showing work to be again on schedule with the Construction Schedule and/or until its work is being installed according to the project construction schedule, without additional cost to the Owner.

E. The Contractor shall achieve substantial completion of its work in accordance with the schedule for the work set forth in the project manual included as part of its agreement with the Owner. Milestone Dates are dates critical to the Owner's operations that establish when a part of the work is to commence or be complete. All Milestone Dates are of the essence and shall have the same meaning as Substantial Completion for the purpose of Liquidated Damages in this Article 13.

F. Substantial completion shall be achieved by the Contractor when the Contractor has completed ninety eight (98%) of its work. Work remaining to be completed after substantial completion shall be limited to items which can ordinarily be completed within the period between the payment at the time of substantial completion and final payment.

G. 1. This project is to be physically completed in accordance with the time limits set forth in the agreement between the Owner and Contractor and as further set forth in the project manual and/or bidding documents. Liquidated damages will be assessed in the amount of \$1,000.00 for each and every calendar day after such time allowed for completion.

2. Contractor realizes that time is of the essence on this Contract and the completion date and milestone date for each work item in its agreement, a Milestone Date reflected on the project schedule, or the date of substantial completion of the Contractor's work shall be no later than the date indicated therein. In the event the Contractor fails to complete any work or substantially complete the work under this contract by said schedule date, the sum per calendar day for each date not met, as delineated above, will be subtracted from the payment due the Contractor (or, if the amount due Contractor as payment is insufficient, any deficiency shall be paid by the Contractor to the Owner), except in cases where the Contractor has applied for and been granted an extension of time in accordance with the provisions of this Article 13.

3. The said sum per calendar day shall constitute the Liquidated Damages incurred by the Owner for each day of delay beyond the agreed upon dates of Substantial Completion. Such Liquidated Damages shall be in addition to any other damages (other than by reason of delay) Owner may incur as a result of Contractor's breach of Contract. In

the event that substantial completion of its work is not achieved in accordance with the project schedule, inspections will be performed once each week unless the Owner or the Architect determines, at their sole discretion, that additional inspections are not needed. All costs incurred by the Owner, Owner's Representative and the cost of additional inspections, at the rate of One Thousand Dollars (\$1,000) per inspection, will be subtracted from payment due the Contractor. If the amount due the Contractor for payment is insufficient, any deficiency shall be paid by the Contractor to the Owner.

H. 1. Within five (5) calendar days from the occurrence of same, the Contractor must apply in writing to the Owner, its Architect or Construction Manager for an extension of time to complete its work where it has been delayed as a result of: unforeseeable causes beyond the control and without the fault or negligence of the contractor, including acts of God, acts of the public enemy, acts of the federal or state government in either their sovereign or contractual capacities, fires, floods, epidemics, quarantine restrictions, priority or allocation orders duly issued by the federal government; freight embargoes; changes in the work to be performed by the Contractor. The Contractor may not apply for an extension of time for delays in acquisitions of materials other than by reason of freight embargoes. All other delays of the project, including but not limited to, Architect review and/or approval of shop drawings and/or submittals, requests for information, clarifications, samples, and change orders; Owner schedule; Architect certification of payment; payment by Owner of Contractor's Application for Payment; coordination amongst Contractors; unavailability of materials and/or equipment; surveying/testing; closeout, etc. are deemed to be foreseeable and, therefore shall not form the basis for a claim for an extension of time by the Contractor.

2. All claims for additional time shall be supported by documentation which demonstrates to the Architect and Construction Manager's satisfaction that the Critical path of the Work has been significantly altered by the delays to the activities in question, and that the schedule cannot be maintained by re-ordering other activities within the project at no cost. Upon receipt of the Contractor's request for an extension of time, the Owner will ascertain the facts and extent of the delay, and may, in its sole discretion, extend the time for completion of the Contractor's work when in its judgment such an extension is justified. The Owner's determination will be final and binding in any litigation commenced by the Contractor against the Owner which arises out of the Owner's denial of an extension of time to the Contractor. Any approval of an extension of the Contractor's time to complete its work shall be memorialized by written change order, signed by the Owner, Contractor, Architect and Construction Manager. Where the Owner determines that the Contractor will be granted an extension of time, such extension shall be computed in accordance with the following:

For each day of delay in the completion of its work, the Contractor shall be allowed one day of additional time to complete its contract. The Contractor shall not be entitled to receive a separate extension of time for each one of several

causes of delay operating concurrently; only the actual period of delay as determined by the Owner or its Architect may be allowed.

3. Notwithstanding anything to the contrary in the Contract Documents, an extension in the contract time, to the extent permitted under subparagraph H of this Article 13, shall be the sole remedy of the Contractor for any (1) delay in the commencement, prosecution, or completion of the Work; (2) hindrance or obstruction in the performance of the Work; (3) loss of productivity or acceleration; or (4) other similar claims (collective referred to herein as "delay(s)"), unless a delay is caused by the Owner's active interference with the Contractor's performance of the Work, and only to the extent such acts continue after the Contractor furnishes the Owner with three (3) days' written notice of such interference. In no event shall the Contractor be entitled to any compensation or recovery of any damages in connection with any Delay, including, but not limited to, consequential damages, lost opportunity costs, impact damages, or other similar remuneration. The Owner's exercise of any of its rights or remedies under the Contract Documents (including, but not limited to, ordering changes in the Work, or directing suspension, rescheduling or correction of the Work), regardless of the extent or frequency of the Owner's exercise of such rights or remedies, shall not be construed as active interference with the Contractor's performance of the Work.

ARTICLE 14

DEFICIENT AND INCOMPLETE WORK

A. The Architect will have the authority to reject work performed by the Contractor which does not conform to the requirements of the drawings and/or specifications.

B. The Architect shall have the authority to require additional inspection or testing of the Contractor's work whether or not such work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the work to have performed additional inspection or testing of the work.

C. 1. If a portion of the Contractor's work is covered contrary to the Architect's request or to requirements specifically expressed in the drawings and/or specifications, upon request by the Architect or the Construction Manager, the Contractor shall uncover such work for the Architect's or any governmental authority's observation and be replaced at the Contractor's sole expense without change in the Contract Time or Contract Sum.

2. If a portion of the Contractor's work has been covered which the Architect or any governmental authority has not specifically requested to observe prior to its being covered, the Architect or any governmental authority may request to see such work and it shall be

uncovered by the Contractor. If such work is in accordance with the drawings and/or specifications, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, the Contractor, at its sole cost and expense, shall uncover and replace such work.

D. The Contractor shall promptly correct work rejected by the Architect or failing to conform to the requirements of its contract with the Owner, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear the all costs of correcting such rejected work, including but not limited to the cost of said additional testing and/or inspection, the cost of the Architect's services incurred in conjunction with such additional testing, and any cost, loss or damages to the Owner resulting from such actions. If prior to the date of Substantial Completion, the Contractor, a Sub-contractor or anyone for whom either is responsible uses or damages any portion of the Work or premises, including, without limitation, mechanical, electrical, plumbing and other building systems, machinery, equipment or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

E. If the Contractor (1) fails to correct work which is not in accordance with the requirements of its agreement with the Owner, or (2) fails to carry out its work in accordance with the requirements of its agreement with the Owner, or (3) fails or refuses to provide a sufficient amount of properly supervised and coordinated labor, materials, or equipment so as to be able to complete the work within the contract time, or (4) fails to remove and discharge (within ten (10) days) any lien filed upon Owner's property by anyone claiming by, through, or under the Contractor, or (5) disregards the instructions of the Architect, Owner or Construction Manager, the Construction Manager, on behalf of the Owner may order the Contractor to stop its work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. This right shall be in addition to, and not in restriction of, other rights the Owner may have pursuant to these General Conditions or at law.

F. 1. If the Contractor defaults or neglects to carry out its work in accordance with its agreement with the Owner and fails within a three (3) day period after receipt of written notice from the Construction Manager to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect, the Construction Manager and the Owner and such other consultants whose participation is deemed necessary by the Architect, for additional services and expenses made necessary by such default, neglect or failure. Such action by the Construction Manager, including the amounts to be charged to the Contractor as a result of such action

are subject to the prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

2. Where the Contractor's default and/or neglect to carry out its work in accordance with its agreement with the Owner threatens the health, safety and/or welfare of the occupants of the school district's facilities and/or threatens the structural integrity and/or preservation of the school district's facilities, the Owner may proceed to carry out the Contractor's work upon twenty-four (24) hours notice of its intention to do so to the Contractor.

G. If the Owner prefers to accept work which is not in accordance with the terms and conditions of the agreement between the Owner and the Contractor, the Owner may, in its discretion, accept such work and reduce the Contractor's contract sum accordingly.

ARTICLE 15

FINAL COMPLETION AND CLOSEOUT OF THE PROJECT

A. 1. When advised by the Construction Manager that the Contractor's work is near substantial completion, the Architect shall visit the site to determine whether the Contractor's work is substantially complete. If the Architect's observations of the Contractor's work discloses any item which has not been performed in accordance with the requirements of the drawings and/or specifications and/or which has not been completed to the point indicated in Article 13 paragraph F of these General Conditions, the Contractor shall complete or correct such items upon receipt of notification from the Architect that a deficiency exists. The Architect shall not issue a certificate of substantial completion for the work of the Contractor until the work has been completed in accordance with Article 13(F). Upon completion of the work outlined by the Architect to it in accordance with this paragraph A, the Contractor shall advise the Architect of the need for an inspection of the work. If the Architect is required to inspect the Contractor's work more than twice, the Contractor shall be liable to the Owner for the services performed by the Architect as a result of additional inspections.

2. Upon determining that the Contractor's work has progressed to the point of Substantial Completion, the Architect shall prepare a punch list of the Contractor's work which shall include only minor items of work remaining to be performed by the Contractor to bring its work into compliance with the requirements of the drawings and/or specifications. The Contractor shall proceed promptly to complete and correct items on the punch list issued by the Architect and shall complete said items within thirty (30) days of its receipt of the punch list from the Architect. At the time of substantial completion, the Owner shall retain 200 percent of the value of the punch list items from the Contractor's remaining contract sum. The value of said remaining work shall be determined by the Architect. Upon completion of the work reflected in the final punch list, the Owner shall release the monies withheld pursuant to this paragraph to the Contractor.

3. The Architect's failure to include an item of deficiency on the punch list issued to the Contractor shall not relieve the contractor of its responsibility to perform its work in accordance with the drawings and/or specifications.

B. 1. If within two (2) years after the date of Substantial Completion of the Contractor's work or designated portion thereof, or after the date for commencement of warranties established pursuant to these General Conditions, or by terms of in applicable special warranty required by the agreement between the Owner and the Contractor, any of the Work is found to be not in accordance with the requirements of said agreement, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This period of two (2) years shall be extended with respect to portions of the Contractor's work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of such work. The obligation set forth hereunder shall survive acceptance by the Owner of the Contractor's and/or termination of the Contractor's agreement with the Owner. The Owner shall give such notice within a reasonable period of time after discovery of the condition.

2. The Contractor shall, within a reasonable time after receipt of written notice thereof, but in no event no later than seventy-two (72) hours after receipt of such notice, commence to correct, repair, and make good any defects in its work.

3. The obligations of the Contractor pursuant to this paragraph shall cover any repairs to or replacement of work affected by the defective work.

4. In the case of any work performed in correcting defects pursuant to this paragraph, the guarantee periods specified herein shall begin anew from the date of acceptance by the Owner of such work.

C. Upon receipt of written notice from the Construction Manager that the Contractor's work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Contractor's work acceptable pursuant to the terms and conditions of its agreement with the Owner and the Contract fully performed and upon receipt of the closeout documentation required by the Contract Documents and elsewhere in the agreement between the Owner and the Contractor, the Architect will certify to the Owner that the Contractor is entitled to final payment on the project.

D. 1. Prior to receipt of final payment from the Owner, the Contractor shall provide to the Architect the close out documentation required by the Contract Documents.

2. The Contractor shall schedule a close out meeting with the Architect and the Construction Manager for the purpose of delivering the close out documents required

pursuant to the Contract Documents and elsewhere in the agreement between the Owner and the Contractor.

E. If the Contractor's work is not accepted by the Owner after final inspection and additional time is required to complete items identified during the final inspection, the date starting the warranty periods described in the Contract Documents shall be set by the Architect at his discretion.

F. If the Architect is required to perform more than one final inspection because the Contractor's work fails to comply with the requirements of the contract, the amount of compensation paid to the Architect by the Owner for additional services shall be deducted from the final payment to the Contractor.

G. Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those claims previously made in writing in accordance with the terms of Article 18 hereof and identified by that payee as unsettled at the time of final Application for Payment.

H. Contractor shall submit all documentation identified in this section within ninety (90) days from the date of Substantial Completion. If the documentation has not been submitted, the Owner will obtain same through whatever means necessary. The Contractor shall solely be responsible for all expenses incurred by the Owner in securing such documentation.

ARTICLE 16

RELEVANT STATUTORY PROVISIONS

A. The Contractor shall at all times observe and comply with all Federal and State Laws and all Laws, Ordinances and Regulations of the Owner, in any manner affecting the work and all such orders decreed as exist at present and those which may be enacted later, by bodies or tribunals having jurisdiction or authority over the work, and the Contractor shall indemnify and save harmless the Owner and all his officers, agents, or servants against any claim or liability arising from, or based on, a violation of any such law, ordinances, regulation, order or decree, whether by himself or by his employee or agents.

B. The Contractor and each of its subcontractors shall comply with Prevailing Wage Rates as issued by the State of New York Department of Labor for the location and duration of this Project and shall comply with all requirements governing its payments to its employees as set forth in Labor Law, section 220 et seq of the New York State Labor Law, as amended.

C. The Contractor and each of its subcontractors shall post a notice at the beginning of the performance of every public work contract on each job site that includes the telephone

number and addresses for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her particular job classification.

D. The Contractor specifically agrees, as required by Labor Law, Sections 220 and 220-d, as amended, that:

1. No laborer, workman or mechanic in the employ of the Contractor, subcontractor or other person doing or contracting to do the whole or any part of the work contemplated by the Contract, shall be permitted or required to work more than eight hours in any one calendar day or more than five days in any one week, except in the emergencies set forth in the Labor Law.

2. The wages paid for a legal day's work shall not be less than the prevailing rate of wages as defined by law.

3. The minimum hourly rate of wages to be paid shall not be less than that stated in the Project Manual, and any re-determination of the prevailing rate of wages after the Contract is approved shall be deemed to be incorporated herein by reference as of the effective date of re-determination and shall form a part of this Contract. The Labor Law provides that the Contract may be forfeited and no sum paid for any work done thereunder on a second conviction for willfully paying less than:

- a. The stipulated wage scale as provided in Labor Law, Section 220, Sub division 3, as amended; or

- b. The stipulated minimum hourly wage scale as provided in Labor Law, Section 220-d, as amended.

E. The Contractor acknowledges that its work is governed by the provisions of Section 101 of the General Municipal Law of the State of New York.

F. The Contractor specifically agrees, as required by the provisions of the Labor Law of New York, Section 220-E, as amended that:

1. In the hiring of employees for the performance of this contract or any sub-contractor hereunder, no contractor, sub-contractor, nor any person acting on behalf of such contractor or sub-contractor shall by reason of race, creed, color or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates.

2. No contractor, sub-contractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, color, creed, sex or national origin.
3. There may be deducted from the amount payable to the Contractor a penalty of fifty dollars for each person for each calendar day during which such person was discriminated against or intimidated in violation of the provisions of the Contract.
4. This Contract may be canceled or terminated by the Owner and all monies due or to become due hereunder may be forfeited for a second or any subsequent violation of the terms or conditions of this section of the Contract.

The aforesaid provisions of this section covering every Contract for or on behalf of the Owner, the State or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.

G. The successful Contractor shall conform to the guidelines spelled out in the County's Affirmative Action Program, if any.

H. The Contractor shall comply with all of the provisions of the Immigration Reform and Control Act of 1986 and regulations promulgated pursuant thereto and shall require its subcontractors to comply with same. The Contractor shall and does hereby agree to fully indemnify, protect, defend, and hold harmless the Owner, Owner's agents and employees from and against any penalties, fees, costs, liabilities, suits, claims, or expenses of any kind or nature, including reasonable attorney's fees, arising out of or resulting from any violation or alleged violation of the provisions of said laws in connection with the work performed hereunder.

I. This Contract shall be void if the Contractor fails to install, maintain, and effectively operate appliances and methods for the elimination of harmful dust when a harmful dust shall have been identified in accordance with Section 222-a of the Labor Law of the State of New York.

J. The Contractor shall insure that absolutely no asbestos containing material is used in conjunction with the performance of its work. The Contractor bears the sole responsibility to provide assurances that no asbestos containing material is built into the construction, or that any equipment used in the construction contains any asbestos containing material. If asbestos containing material is found, at any time during or after the construction is completed, it shall be the responsibility of the Contractor who installed said material to remove it and replace it with new non-asbestos containing material, as per federal, state and local mandates.

K. Large and small asbestos abatement projects as defined by 12 N.Y.C.R.R. 56 shall not be performed while the building is occupied. As referenced in this section, the term "building" shall mean a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated portion of the building must contain exits that do not pass through the occupied portion, and ventilation systems must be physically separated and sealed at the isolation barrier. Exterior work such as roofing, flashing, siding or soffit work may be performed on occupied buildings provided proper variances are in place as required, and complete isolation of ventilation systems and windows is provided. Work must be scheduled so that classes are not disrupted by noise or visual distraction.

L Surfaces that will be disturbed by reconstruction must have a determination made as to the presence of lead. Projects which disturb surfaces that contain lead shall have in the specifications a plan prepared by a certified Lead Risk Assessor or Supervisor which details provisions for occupant protection, worksite preparation, work methods, cleaning and clearance testing which are in general accordance with the HUD Guidelines.

M. No smoking is allowed anywhere on school property per New York State and County law. Violators are subject to a \$1,000 fine and/or banishment from the property.

N. Applicable codes and standards for material furnished and work installed shall include all state laws, local ordinances, requirements of governmental agencies having jurisdiction, and applicable requirements of following codes and standards, including but not limited to:

1. New York State Uniform Fire Prevention and Building Code, and amendments thereto.

2. New York State Energy Conservation Construction Code.

3. State Education Department Manual of Planning Standards.

4. New York State Department of Transportation, Office of Engineering, Standard Specification, Construction and Materials, latest edition.

5. Life Safety Code - NFPA.

O. Wherever in the specifications reference is made to ANSI or ASTM Standards, Federal Specifications, Consumer Product Standards, or similar recognized standards, the latest edition of the respective publishing agency in effect at the date of "Bid Issuance" shall be accepted as establishing the technical requirements for which compliance is required.

P. The Owner shall be entitled to request of Contractor or its successor in interest adequate assurance of future performance in accordance with the terms and conditions of its agreement in the event (1) an order for relief is entered on behalf of the Contractor pursuant to Title 11 of the United States Code, (2) any other similar order is entered under any other debtor relief laws, (3) the Contractor makes a general assignment for the benefit of its creditors, (4) a receiver is appointed for the benefit of its creditors, or (5) a receiver is appointed on account of its insolvency. Failure to comply with such request within ten (10) days of delivery of the request shall entitle the Owner to terminate the Contract in accordance with Article 17 hereof. In all events, pending receipt of adequate assurance of performance and actual performance in accordance therewith, the Owner shall be entitled to proceed with the Contractor's work with its own forces or with other contractors on a time and material or other appropriate basis, the cost of which will be back charged against the Contractor.

Q. The Contractor shall maintain policies of employment as follows:

1. The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

2. The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

ARTICLE 17

TERMINATION OR SUSPENSION

- A. 1. The Owner may terminate the Contractor's agreement in the event the Contractor:
- a. refuses or fails to supply sufficient skilled workers or suitable materials or equipment to complete the Work in a diligent, efficient, timely, workmanlike, skillful, and careful manner;
 - b. refuses or fails to correct deficient work performed by it;

- c. fails to make prompt payments to subcontractors for labor, materials, and/or equipment in accordance with the respective agreements between the Contractor and the Subcontractors;
- d. disregards laws, ordinances, rules, regulations, or orders of a public authority having jurisdiction;
- e. disregards the instructions of the Architect, Construction Manager or the Owner (when such instructions are based on the requirements of the Contract Documents);
- f. is adjudged a bankrupt or insolvent, or makes a general assignment for the benefit of Contractor's creditors, or a trustee or receiver is appointed for Contractor or for any of its property, or files a petition to take advantage of any debtor's act or to reorganize under bankruptcy or similar laws; or
- g. breaches any warranty made by the Contractor under or pursuant to the Contract Documents.
- h. fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all the requirements of the Contract Documents; or
- i. fails after commencement of the Work to proceed continuously with the construction and completion of the Work for more than ten (10) days, except as permitted under the Contract Documents.
- j. fails to keep the Project free from strikes, work stoppages, slowdowns, lockouts or other disruptive activity;
- k. or otherwise does not fully comply with the Contract Documents.

2. When any of the above reasons exists, may without prejudice to any other rights or remedies of the Owner, terminate employment of the Contractor upon three (3) days written notice and may, subject to any prior rights of the surety:

- a. take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- b. take possession of materials stored off site by the Contractor;

- c. take assignments of the Contractor's subcontractors in accordance with these General Conditions;
- d. finish the Work by whatever reasonable method the Owner may deem expedient.

3. When the Owner terminates the Contract for one of the reasons stated in Subparagraph 1 hereof, the Contractor shall not be entitled to receive further payment until the completion of the Contractor's work. If the Owner's costs to complete the Contractor's work, including the expenses incurred by the Owner in connection with the services of the Architect, the Construction Manager and/or other consultants, exceed the contract balance remaining on the Contractor's contract, the Contractor shall be liable to the Owner for such excess costs. This provision shall survive termination of the Contractor's agreement with the Owner.

4. In the event a court or other tribunal issues a final determination that Owner's termination for cause was arbitrary, capricious or otherwise without cause and/or reverses Owner's termination for cause, such termination shall, without further action on the part of Owner, be converted to a termination for convenience, as set forth in (B), below.

B. 1. In addition to the Owner's right to carry out the work of the Contractor pursuant to its agreement with the Contractor, the Owner may at any time, at will and without cause, terminate any part of the Contractor's work or all of the Contractor's remaining work for any reason whatsoever by giving three (3) days' written notice to Contractor, specifying the portion of the Contractor's work to be terminated and the effective date of termination.

2. Upon receipt of a notice of termination for convenience, the Contractor shall immediately, in accordance with instructions from the Owner, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:

- a. cease operation as specified in the notice;
- b. place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete continued portions of the Contract;
- c. terminate all subcontracts and orders to the extent they relate to the Work terminated;
- d. proceed to complete the performance of the remaining work on its contract which has not been so terminated; and
- e. take actions that may be necessary, or that the Owner may direct, for

the protection and preservation of the terminated Work.

3. The Contractor shall continue to prosecute that portion of its work which has not been terminated by the Owner pursuant to this paragraph. If the Contractor's work is so terminated, the Owner shall not be liable to the Contractor by reason of such termination except that the Contractor shall be entitled to payment for the work it has properly executed in accordance with its agreement and prior to the effective date of termination (the basis for such payment shall be as provided in the Contract) and for costs directly related to work thereafter performed by Contractor in terminating such Work, provided such work is authorized in advance by the Architect and the Owner. No payment shall be made by Owner, however, to the extent that such work is, was, or could have been terminated under the Contractor's agreement with the Owner.

4. In case of a termination pursuant to this paragraph B, the Owner will issue a Construction Change Directive or authorize a Change Order, making any required adjustment to the Date of Substantial Completion and/or the sum of contract monies remaining to be paid to the Contractor. The Owner shall be credited for (1) payments previously made to the Contractor for the terminated portion of the Work, (2) claims which the Owner has against the Contractor under the Contract and (3) the value of the materials, supplies, equipment or other items that are to be disposed of by the Contractor that are part of the Contract Sum; multiplied by 15% representing the Contractor's overhead and profit.

5. For the remaining portions of the Contractor's work which have not been terminated pursuant to this paragraph B, the terms and conditions of the Contractor's agreement with the Owner shall remain in full force and effect.

6. Upon termination of the Contractor's work or a portion of the Contractor's work pursuant to this paragraph B, the Contractor shall recover as its sole remedy, payment for work which it has properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered and stored in accordance with the Owner's instructions. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, overhead and profit related to work terminated by the Owner pursuant to this paragraph B.

C. 1. In addition to Owner's right to suspend, delay, or interrupt Contractor from proceeding with any portion of its work pursuant to the terms and conditions of its agreement with the Owner, the Owner may at any time, at will and without cause suspend, delay, or interrupt any part of the Contractor's work or all work for any reason whatsoever for such period of time as the Owner may determine by giving three (3) days' prior written notice to Contractor, specifying that portion of the Contractor's work which is to be suspended, delayed, or interrupted, and the effective date of such suspension, delay, or interruption, as the case may be.

2. The Contractor shall continue to prosecute that portion of its work which has not been suspended, delayed, or interrupted, and shall properly protect and secure the portion of its work so suspended, delayed or interrupted.

3. The Owner shall incur no liability to Contractor by reason of such suspension, delay, or interruption except that Contractor may request an extension of its time to complete its work in accordance with Article 13 hereof.

D. The Contractor agrees and acknowledges that payments for the work have been obtained through obligations or bonds which have been sold after public referendum. In the event the work is suspended or canceled as a result of the order of any court, agency, department entity or individual having jurisdiction, or in the event the work is suspended or canceled due to the fact that a court, agency, department, entity or individual having jurisdiction has issued an order, the result of which is that the aforesaid obligations or bonds are no longer available for payment for the work, the Contractor expressly agrees that it shall be solely entitled to payment for work accomplished until a notice of suspension or cancellation is served upon it. The Contractor expressly waives any and all rights to institute an action, claim, cause of action or similar for any damages it may suffer as a result of the suspension or cancellation of the Work and/or its contract pursuant to this section.

ARTICLE 18 CLAIMS AND DISPUTES

A. Definition. A "Claim" is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract.

B. Time Limits on Claims. Claims by the Contractor must be made within thirty (30) days after occurrence of the event giving rise to such Claim, or within thirty (30) days after the claimant first recognizes the condition giving rise to the Claim, whichever is earlier. Claims must be made by written notice. An additional Claim made after the initial Claim has been decided by the Owner will not be considered unless submitted in a timely manner. Failure of the Contractor to give timely notice of claim shall constitute waiver of the claim. Claims must be made by written notice to the Construction Manager, Architect and Owner. The responsibility to substantiate Claims shall rest with the Contractor.

C. Pending final resolution of a Claim, unless otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

D. Claims for Concealed or Unknown Conditions. If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the Contractor shall be given to the Owner and Architect promptly before conditions are disturbed and in no event later than five (5) days after first observance of the conditions; and, (3) in the case of a condition at the site which involves a hazardous or toxic substance, as those terms are defined by OSHA or AHERA, notice to the Owner, the Construction Manager and the Architect shall be given immediately upon discovery of such hazardous or toxic substance. The Architect, and/or Construction Manager will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall so notify the Contractor in writing, stating the reasons.

E. Claims for Additional Cost. If the Contractor wishes to make Claim for an increase in the Contract Sum as a result of a Change in the Work pursuant to Article 8 of these General Conditions, written notice as provided in this Article 18 shall be given before proceeding to execute the Work.

F. Claims for Additional Time. If the Contractor wishes to make Claim for an increase in the Contract Time, the Contractor shall comply with the requirements set forth in Article 13.

G. Nothing contained in the Contract Documents shall relieve a Contractor from compliance with any statutory requirement, including, but not limited to those contained in Education Law Section 3813.

ARTICLE 19 MISCELLANEOUS PROVISIONS

A. The agreement between the Owner and the Contractor shall be governed by the law of the place where the project is located; venue to be in the County in which the project is located.

B. Historical lack of enforcement of any law, local or otherwise, shall not constitute a waiver of Contractor's responsibility for compliance with such law in a manner consistent with its agreement with the Owner unless and until the Contractor has received written consent for the waiver of such compliance from the Owner and the Agency responsible for the enforcement of such law.

C. All notices to be given hereunder shall be in writing and may be given, served, or made (1) by depositing the same for first class mail delivery in the United States mail addressed to the authorized representative of the party to be notified; (2) by depositing the same in the United States mail addressed to the authorized representative of the party to be notified, postpaid and registered or certified with return receipt requested; (3) by depositing the same for overnight delivery (prepaid by or billed to the party giving notice) with the United States Postal Service or other nationally recognized overnight delivery service addressed to the authorized representative of the party to be notified; or (4) by delivering the same in person to the said authorized representative of such party. Notice deposited in the mail by certified mail or overnight delivery in accordance with the provisions hereof shall be effective from and after the fourth (4th) day next following the date postmarked on the envelope containing such notice, or when actually received, whichever is earlier. All notices to be given to the parties hereto shall be sent to or made at the addresses set forth hereinbelow. By giving the other parties at least seven (7) days' written notice thereof, the parties hereto shall have the right to change their respective addresses and specify as their respective addresses for the purposes hereof any other address in the United States of America.

D. Except as expressly provided in the agreement between the Owner and the Contractor, duties and obligations imposed by such agreement and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law, or in equity or by other agreement, and such rights and remedies shall survive acceptance of the Contractor's work and/or any other termination of the Contractor's agreement with the Owner.

E. No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

F. The headings denoting the separately numbered Articles of these General Conditions are specifically set forth for reference purposes only and are not in any way to be deemed explanatory of or limiting of the contents of any paragraph or subparagraph. Furthermore, said headings are not to be deemed part of this Agreement for purposes of interpretation, litigation or as defining or limiting the rights or obligations of the parties.

G. In case any provision of this Agreement should be held to be contrary to, or invalid, under the law of any country, state or other jurisdiction, such illegality or invalidity, shall not affect in any way, any other provisions hereof, all of which shall continue, nevertheless, in full force and effect in any country, state or jurisdiction in which such provision is legal and valid.

H. The rights stated in these General Conditions and the documents which form the agreement between the Owner and the Contractor are cumulative and not in limitation of any rights of the Owner at law or in equity.

I. The Owner shall not be responsible for damages or for loss of anticipated profits on work not performed on account of any termination of the Contractor by the Owner or by virtue of the Owner's exercise of its right to take over the Contractor's work pursuant to its agreement with the Contractor.

J. The Owner shall not be liable to the Contractor for punitive damages on account of any its termination of the Contractor or any other alleged breach of the agreement between it and the Contractor and the Contractor hereby expressly waives its right to claim such damages against the Owner.

K. The Contractor hereby expressly waives any rights it may have in law or in equity to lost bonding capacity as a result of any of the actions of the Owner, the Architect or the Construction Manager taken in connection with the Contractor's work on the Project.

L. Upon determination by legal means (e.g. court action, etc.) that termination of Contractor pursuant to Article 17.A.1 was wrongful, such termination will be deemed converted to a termination for convenience pursuant to Article 17.B.1 and Contractor's remedy for such termination shall be limited to the recovery of the payments permitted for termination for convenience as set forth in Article 17.B.1.

M. As between the Owner and Contractor:

1. Before Substantial Completion. As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;

2. Between Substantial Completion and Final Certificate for Payment. As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and
3. After Final Certificate for Payment. As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to warranties provided in accordance with its agreement with the Owner, the date of any correction of work performed by the Contractor or failure to correct its work, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

N. 1. The Owner may occupy or use any completed or partially completed portion of the Contractor's work at any stage when such occupancy is authorized by public authorities having jurisdiction over the project.

2. Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of the Contractor's work, nor does it waive the Owner's right to liquidated damages. Further such occupancy alone shall not determine when substantial completion and performance has been reached

3. Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Contractor's work, and in order to prepare a complete punchlist of omissions of materials, faulty workmanship, or any items to be repaired, torn out or replaced.

O. The Contractor agrees not to assign, transfer, convey or sublet or otherwise dispose of this Contract or his right, title and interest therein or his power to execute such Contract, to any other person, firm or corporation without the previous consent in writing of the Owner.

P. The Owner is a tax exempt organization and will take title to materials used in the Project in order to permit tax exemption.

Q. The Owner will furnish a certificate with the Owner's Tax Exemption Number to the Contractor for use in purchasing tangible personal property required for the Project.

R. This exemption shall not apply to machinery, equipment, tools, and other items purchased, leased, rented, or otherwise acquired for the Contractor's use even though the machinery, equipment, tools or other items are used either in part or entirely on the Work. This exemption shall apply only to materials fully incorporated into the Work of the Contract as accepted and approved by the Architect.

S. The Contractor shall, upon request by the Owner, furnish a bill of sale or other instrument indicating the quantities and types of materials purchased directly by the Contractor or subcontractor for incorporation into the Work. Upon delivery of the materials to the site, the Contractor shall mark or otherwise identify the materials to be incorporated into the Work. This exemption shall apply only to materials so identified and accepted.

END OF GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

NYSED 155.5 REGULATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies requirements of 8NYCRR155.5, Uniform Safety Standards for School Construction and Maintenance Projects, that are required in construction documents. The Contractor shall comply with these requirements in addition to any and all similar requirements in the Contract Documents.

1.3 REQUIREMENTS

- A. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy. In addition, the following shall be strictly enforced and cooperated with:
 - 1. No smoking is allowed on public school property, including construction areas.
 - 2. During construction daily inspections of district occupied areas shall be conducted by school district personnel to assure that construction materials, equipment or debris do not block fire exits or emergency egress windows.
 - 3. Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.
- B. Verify that all school areas to be disturbed during renovation or demolition have been or will be tested for lead and for asbestos. For any project work that disturbs surfaces that contain lead or asbestos, follow the plans and specifications prepared by a certified Lead Risk Assessor or Supervisor which details provisions for occupant protection, worksite preparation, work methods, cleaning, and clearance testing; which are in general accordance with HUD Guidelines.
 - 1. All asbestos abatement projects shall comply with all applicable federal and State laws including but not limited to the New York

State Department of Labor industrial code rule 56(12NYCRR56), and the federal Asbestos Hazard Emergency Response Act (AHERA), 40 CFR Part 763 (Code of Federal Regulations, 1998 Edition); available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234.

2. Any construction or maintenance operations which will disturb lead-based paint will require abatement of those areas pursuant to protocols detailed in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing", June 1995; U.S. Department of Housing and Urban Development (HUD), Washington, D.C. 20410; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234.

C. General Safety and Security Standards for Construction Projects:

1. All construction materials shall be stored in a safe and secure manner.
2. Fences around construction supplies or debris shall be maintained.
3. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
4. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warnings signs to prevent entry.
5. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.

D. Separation of construction areas from occupied spaces. Construction areas which are under the control of a contractor and therefore not occupied by district staff or students, shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.

1. A specific stairwell and/or elevator may be assigned for construction worker use during the work hours. In general,

workers may not use the corridors, stairs or elevators designated for students or school staff.

2. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
3. All occupied parts of the buildings affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.

E. The Architect will prepare phasing plans indicating exiting, required by the applicable building code, which shall be maintained during construction.

1. The Contractor shall submit plans, to be approved by the Architect, indicating temporary construction required to isolate construction equipment, materials, people, dust, fumes, odors, and noise during the construction period and meeting the requirements of the phasing plans.
2. Temporary construction details shall meet code-required fire ratings for separation and corridor enclosure.
3. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.

F. Prepare a plan detailing how adequate ventilation will be maintained during construction.

1. The plan shall indicate ductwork which must be rerouted, disconnected, or capped in order to prevent contaminants from the construction area from entering the occupied areas of the building.
2. The plan shall also indicate how required ventilation to occupied spaces affected by construction will be maintained during the project.

G. Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken.

- H. The contractor shall be responsible for the control of chemical fumes, gases, and other contaminants produced by welding, gasoline or diesel engines, roofing, paving, painting, etc. to ensure they do not enter occupied portions of the building or air intakes.
- I. The contractor shall be responsible to ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured or ventilated in accordance with manufacturers recommendations before a space can be occupied.
- J. Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied. The term "building", as used in this paragraph, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated portion of the building must contain exits that do not pass through the occupied portion, and ventilation systems must be physically separated and sealed at the isolation barrier.
- K. Exterior work such as roofing, flashing, siding, or soffit work may be performed on occupied buildings provided proper variances are in place as required, and complete isolation of ventilation systems and at windows is provided. Care must be taken to schedule work so that classes are not disrupted by noise or visual distraction.

IN ACCORDANCE WITH ARTICLE 8, SECTION 220 (3-a) OF THE NEW YORK STATE LABOR LAW, THE FOLLOWING LINK REPRESENTS THE MOST CURRENT PREVAILING WAGE RATE SCHEDULES AT THE TIME OF BIDDING, ISSUED BY THE NEW YORK STATE DEPARTMENT OF LABOR SPECIFICALLY REQUESTED FOR THIS PROJECT:

PRC# 2024005839

<https://apps.labor.ny.gov/wpp/publicViewProject.do?method=showIt&id=1568841>

CONTRACTOR IS TO OBTAIN THE PREVAILING WAGE RATES GENERATED FOR THIS PROJECT AT THE NEW YORK STATE DEPARTMENT OF LABOR WEBSITE.

- ASSEMBLY BILL NUMBER 1839
- NOTICES REGARDING WAGE RATE UPDATES
- WAGE RATE SCHEDULE
- LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE AWARDED PUBLIC WORK

WHITE PLAINS CITY SCHOOL DISTRICT

Board of Education

5 Homeside Lane, White Plains, NY 10605

White Plains, NY 10605

NAME OF CONTRACTOR		OR SUBCONTRACTOR		ADDRESS		OMB No.: 1235-0008 Expires: 02/28/2018	
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PAYROLL NO.		FOR WEEK ENDING		PROJECT AND LOCATION		PROJECT OR CONTRACT NO.	
-------------	--	-----------------	--	----------------------	--	-------------------------	--

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT OR ST.	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS						(9) NET WAGES PAID FOR WEEK
				HOURS WORKED EACH DAY																
				FICA	WITH- HOLDING TAX			OTHER	TOTAL DEDUCTIONS											
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While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

Date _____

I, _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by _____ on the _____
(Contractor or Subcontractor)
_____ ; that during the payroll period commencing on the _____
(Building or Work)
_____ day of _____, _____, and ending the _____ day of _____, _____,
all persons employed on said project have been paid the full weekly wages earned, that no rebates have
been or will be made either directly or indirectly to or on behalf of said
_____ from the full
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly
from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part
3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948,
63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are
correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the
applicable wage rates contained in any wage determination incorporated into the contract; that the classifications
set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship
program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and
Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered
with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:
(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

- in addition to the basic hourly wage rates paid to each laborer or mechanic listed in
the above referenced payroll, payments of fringe benefits as listed in the contract
have been or will be made to appropriate programs for the benefit of such employees,
except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

- Each laborer or mechanic listed in the above referenced payroll has been paid,
as indicated on the payroll, an amount not less than the sum of the applicable
basic hourly wage rate plus the amount of the required fringe benefits as listed
in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR
SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE
31 OF THE UNITED STATES CODE.

DRAFT AIA Document A310™ - 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal place of business)

« »
« »

OWNER:

(Name, legal status and address)

« »
« »

BOND AMOUNT: \$ « »

PROJECT:

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

«PWA»

« »
« »

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

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

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

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

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

ELECTRONIC COPYING of any portion of this AIA Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

Signed and sealed this « » day of « », « »

(Witness)

(Witness)

« »

(Contractor as Principal)

(Seal)

« »

(Title)

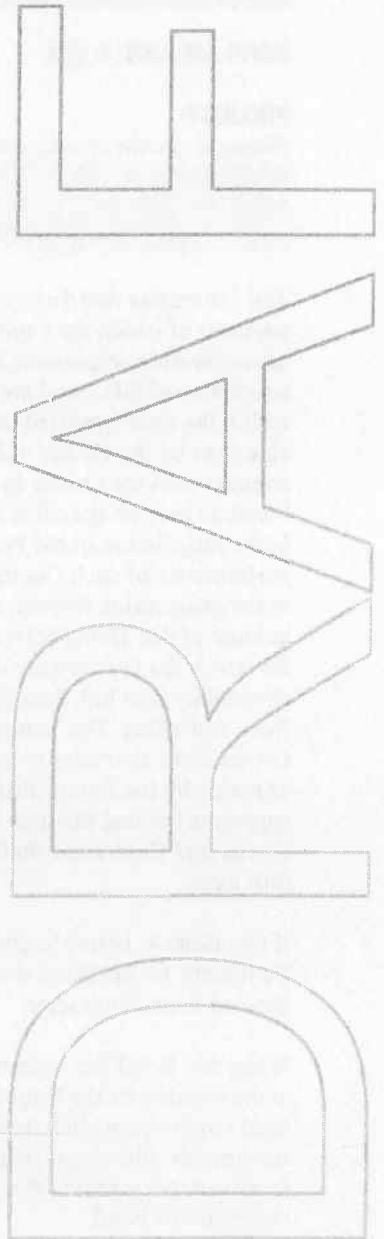
« »

(Surety)

(Seal)

« »

(Title)



DRAFT AIA® Document A312™ - 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal
place of business)

« »
« »

OWNER:

(Name, legal status and address)

« »
« »

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

«PWA»

« »

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this Bond:

« »

None

« »

See Section 16

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature:

Name and « »

Title:

(Any additional signatures appear on the last page of this Performance Bond.)

Signature:

Name and « »

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

« »
« »
« »
« »
« »
« »

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

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

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

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

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

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company:

(Corporate Seal)

SURETY

Company:

(Corporate Seal)

Signature:

Name and Title:

« »« »

Address:

« »

Signature:

Name and Title:

« »« »

Address:

« »

DRAFT AIA Document A312™ - 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal place of business)

« »
« »

OWNER:

(Name, legal status and address)

« »
« »

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

«PWA»

« »

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this Bond:

« »

None

« »

See Section 18

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature:

Name and « »

Title:

Signature:

Name and « »

Title:

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

« »
« »
« »
« »
« »
« »

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An Additions and Deletions Report that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

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

ELECTRONIC COPYING of any portion of this AIA Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

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

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: _____

Name and Title: « »« »

Address: « »

SURETY

Company: _____ (Corporate Seal)

Signature: _____

Name and Title: « »« »

Address: « »

Application and Certificate for Payment

TO OWNER: PROJECT: PWA APPLICATION NO: 001 Distribution to: OWNER: ARCHITECT: CONTRACTOR: FIELD: FROM CONTRACTOR: VIA ARCHITECT: PERIOD TO: CONTRACT FOR: General Construction CONTRACT DATE: PROJECT NOS:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

- 1. ORIGINAL CONTRACT SUM.....\$0.00
- 2. NET CHANGE BY CHANGE ORDERS.....\$0.00
- 3. CONTRACT SUM TO DATE (Line 1 ± 2).....\$0.00
- 4. TOTAL COMPLETED & STORED TO DATE (Column G on G703).....\$0.00
- 5. RETAINAGE:

- a. 0 % of Completed Work (Column D + E on G703): \$0.00 = \$0.00
- b. 0 % of Stored Material (Column F on G703): \$0.00 = \$0.00

Total Retainage (Lines 5a + 5b or Total in Column I of G703).....\$0.00

6. TOTAL EARNED LESS RETAINAGE.....\$0.00

(Line 4 Less Line 5 Total)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT.....\$0.00

(Line 6 from prior Certificate)

8. CURRENT PAYMENT DUE.....\$0.00

9. BALANCE TO FINISH, INCLUDING RETAINAGE

(Line 3 less Line 6)

\$0.00

AMOUNT CERTIFIED.....

\$0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$0.00	\$0.00
Total approved this Month	\$0.00	\$0.00
TOTALS	\$0.00	\$0.00
NET CHANGES by Change Order		\$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By:

Date:

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED.....

\$0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By:

Date:

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

AIA Document, G702™-1992, Application and Certification for Payment, or G736™-2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.

In tabulations below, amounts are in US dollars.

Use Column 1 on Contracts where variable retainage for line items may apply.

[illegible]

DRAFT AIA Document G704™ - 2000

Certificate of Substantial Completion

PROJECT:
(Name and address)
PWA

PROJECT NUMBER: /
CONTRACT FOR: General Construction
CONTRACT DATE:

TO OWNER:
(Name and address)

TO CONTRACTOR:
(Name and address)

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

PROJECT OR PORTION OF THE PROJECT DESIGNATED FOR PARTIAL OCCUPANCY OR USE SHALL INCLUDE:

The Work performed under this Contract has been reviewed and found, to the Architect's best knowledge, information and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated above is the date of issuance established by this Certificate, which is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

Warranty

Date of Commencement

ARCHITECT

BY

DATE OF ISSUANCE

A list of items to be completed or corrected is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment.

Cost estimate of Work that is incomplete or defective: \$0.00

The Contractor will complete or correct the Work on the list of items attached hereto within Zero (0) days from the above date of Substantial Completion.

CONTRACTOR

BY

DATE

The Owner accepts the Work or designated portion as substantially complete and will assume full possession at _____ (time) on _____ (date).

OWNER

BY

DATE

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance shall be as follows:

(Note: Owner's and Contractor's legal and insurance counsel should determine and review insurance requirements and coverage.)

DRAFT AIA Document G706™ - 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: (Name and address)
PWA

ARCHITECT'S PROJECT NUMBER:

TO OWNER: (Name and address)

CONTRACT FOR: General Construction

CONTRACT DATED:

OWNER: ☐

ARCHITECT: ☐

CONTRACTOR: ☐

SURETY: ☐

OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: (Name and address)

BY:

(Signature of authorized representative)

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

DRAFT AIA® Document G706A™ - 1994

Contractor's Affidavit of Release of Liens

PROJECT: *(Name and address)*

PWA

TO OWNER: *(Name and address)*

ARCHITECT'S PROJECT
NUMBER:

CONTRACT FOR: General
Construction

CONTRACT DATED:

OWNER: ☐

ARCHITECT: ☐

CONTRACTOR: ☐

SURETY: ☐

OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY:

*(Signature of authorized
representative)*

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:

DRAFT AIA Document G707™ - 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)*

PWA

ARCHITECT'S PROJECT NUMBER:

CONTRACT FOR: General Construction

TO OWNER: *(Name and address)*

CONTRACT DATED:

OWNER: ☐

ARCHITECT: ☐

CONTRACTOR: ☐

SURETY: ☐

OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

on bond of
(Insert name and address of Contractor)

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the
Surety of any of its obligations to
(Insert name and address of Owner)

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

(Surety)

(Signature of authorized representative)

(Printed name and title)

Attest:

(Seal):

PART 1 - GENERAL

1.01 BRIEF PURPOSE OF PROJECT / GENERAL

- A. The purpose of the project is to renovate the Classrooms, Science Room, Art Room, Staff Toilets, and replacement of all windows.
- B. This Section provides an abbreviated summary of the work for the Construction Contracts associated with the Owner's program to construct the project.
- C. In the event that any of the provisions in the technical specifications conflicts with the general conditions, the provision more favorable to the owner, as determined by the owner in its sole discretion, shall govern.

1.02 NOMENCLATURE

- A. Where the terms "Engineer/Architect", "Architect/Engineer", "Engineer", or "Architect" are used throughout these Contract Documents, they shall mean the firm of H2M architects + engineers as may be abbreviated by H2M or H2M Group.
- B. The General Construction Contractor may be referred to as the "General Contractor", "Prime General Contractor", "Contract G Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract G.
- C. The Electrical Construction Contractor may be referred to as the "Electrical Contractor", "Prime Electrical Contractor", "Contract E Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract E.
- D. The Heating, Ventilating & Air Conditioning Construction Contractor may be referred to as the "HVAC Contractor", "Prime HVAC Contractor", "Contract H Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract H.
- E. The Plumbing Construction Contractor may be referred to as the "Plumbing Contractor", "Prime Plumbing Contractor", "Contract P Contractor" or similar wording. The lack of word capitalization shall be incidental. This Construction Contract shall be known as Contract P.
- F. Where the terms "Owner" or "Owner's Construction Representative" are used, they will be defined as a person selected by the Owner, or the actual Owner, WHITE PLAINS CITY SCHOOL DISTRICT .

1.03 ABBREVIATED SUMMARY OF CONTRACT G WORK

- A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each contractor shall coordinate, through the Owner/Architect, the work of their contract with the work by others.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 - 1. to renovate the Classrooms, Science Room, Art Room, Staff Toilets, and replacement of all windows.
 - 2. Demolition and removals as shown,

3. Project closeout submittals.

D. All other work shown and specified within the Contract Documents for Contract G.

1.04 ABBREVIATED SUMMARY OF CONTRACT E WORK

- A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each Contractor shall coordinate, through the Owner/Architect, the work of their contract with the work by others.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
1. Provide, install, maintain, and repair, if necessary, temporary power and light throughout the site and to the Owner/Architect's field office. Temporary power shall be provided at location(s) selected by the Architect based on input by the General Contractor.
 2. Arrange for and install primary electric service.
 3. Main secondary feeders, power distribution, and instrumentation control wiring. Provide, mount, and install electrical conduit, wire, fittings, boxes, panels, and electrical accessories.
 4. All clearing, excavation, filling, and backfilling associated with the installation of underground conduit, duct bank, or wiring.
 5. Furnish, install and power primary flow elements, transmitters, flow recorders and install interconnecting wiring where said devices are to be provided as work of Contract E. Install and power primary flow elements, transmitters, flow recorders and install interconnecting wiring where said devices are to be provided as work of other contracts.
 6. Setting of electrical sleeves and/or embedded conduit in all concrete construction. All conduit for new construction shall be embedded in concrete slabs, decks, or walls.
 7. Electrical connections (final termination) to all equipment, control panels, ventilating equipment and electrical devices.
 8. Startup participation for the various equipment and systems of the project and provide complete service to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation.
 9. Removal of existing components as noted.
 10. New secondary feeders, power distribution, and instrumentation control wiring. New electrical conduit, wire, fittings, boxes, panels, and electrical accessories.
 11. New lighting fixtures, wiring and associated equipment.
 12. All excavation, trenching, backfilling, and rough grading associated with the installation of pull-boxes, underground conduit, and wiring. Final restoration by Contract G.
 13. Final electrical terminations to all control panels, pumping equipment, blowers, HVAC equipment, etc.
 14. Wiring connections to all electrical equipment (including equipment furnished by others).
 15. Testing, programming and adjusting of all electrical systems.
 16. Project closeout submittals.

1.05 ABBREVIATED SUMMARY OF CONTRACT M WORK

- A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each contractor shall coordinate, through the Owner/Architect, the work of their contract with the work by others.

- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 - 1. Startup participation for the various equipment and systems of the project and provide complete service to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation.
 - 2. New electric unit heaters.
 - 3. New gas-fired unit heaters.
 - 4. New hydronic unit heaters and associated piping.
 - 5. New exhaust fans, supports, and associated equipment.
 - 6. New grilles, registers, duct work, supports and accessories.
 - 7. New air conditioning system.
 - 8. Testing and balancing of systems.
 - 9. Project closeout submittals.
- D. All other work shown and specified in the Contract Documents for Contract M.

1.06 ABBREVIATED SUMMARY OF CONTRACT P WORK

- A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract. Each contractor shall coordinate, through the Owner/Architect, the work of their contract with the work by others.
- B. This following abbreviated summary is provided in order to briefly describe the work covered by the Contract Documents for this Construction Contract. It is not all inclusive of the work under the Contract.
- C. The work includes, but is not limited to, the following:
 - 1. Startup participation for the various equipment and systems of the project and provide complete service to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation.
 - 2. Removal of existing interior piping, valves, and mechanical equipment, as noted.
 - 3. New interior large mechanical piping, valves, and accessories.
 - 4. New penetration sleeves, placement to be coordinated with Contract G.
 - 5. Testing and adjusting of mechanical systems.
 - 6. Disinfection and water quality testing.
 - 7. Startup participation for the various equipment and systems of the project. Provide complete services to troubleshoot and assist manufacturer service representatives in obtaining a completely functional installation. Provide systems and equipment training for Owner personnel.
 - 8. Project closeout submittals.
- D. All other work shown and specified in the Contract Documents for Contract P.

1.07 PARTIAL LISTING OF SPECIFIC CONTRACT REQUIREMENTS

- A. The Contract Documents detail the work included in the Contract. Related requirements and conditions covered by the Contract Documents include, but are not limited to, the following:
 - 1. The contractor shall adhere to all New York State Education Department requirements, including but not limited to NYCRR, Title 8, Chapter 2, Part 155.5 - Uniform Safety Standards for School Construction and Maintenance
 - 2. Guidelines and requirements of the local Health Department.

3. The contractor shall adhere to all New York State Education Department requirements, including but not limited to NYCRR, Title 8, Chapter 2, Part 155.5 - Uniform Safety Standards for School Construction and Maintenance.

1.08 PARTIAL LISTING OF OVERALL CONTRACT REQUIREMENTS

- A. The Contract Documents detail the work included in the Contract. Related requirements and conditions covered by the Contract Documents include, but is not limited to, the following:
 1. Debris removal and daily and final cleaning up.
 2. Coordination with utility companies necessary to schedule connection of services, and management of the installation.
 3. Site utilization and management so as not to disrupt the Owner's ability to operate the existing facilities in a safe and efficient manner.
 4. Maintain the Owner's ability to operate the facility at all times during the construction period.
 5. Facilities to be used during the contract period that are to be used by the Owner or his representatives and others involved with constructing the project.
 6. Product and equipment storage and handling requirements.
 7. Starting and adjusting of the equipment and systems required under the project.
 8. Site safety in accordance with all applicable federal, state, and local regulations.
 9. Project submittals, testing services, work plans, schedules, shop drawings, closeout procedures and documents, manuals, as-built drawings, final commissioning, of the work shall be provided as required by the Contract.
 10. To not hinder the Owner's ability to deliver a safe and potable water supply.
- B. Each Contractor shall coordinate the work between the various construction contracts, through the Owner/Architect, as required to complete the contract requirements in accordance with the requirements contained in Section 013100.

1.09 OWNER SUPPLIED PRODUCTS AND UTILITIES

- A. The Owner will not be supplying equipment, labor, or tools for the project.

1.10 EXISTING CONDITIONS

- A. The Drawings show certain information that has been obtained by the Owner regarding various conditions that exist at the location of the project both below and at grade.
- B. The Owner and the Architect expressly disclaims all responsibility for the accuracy or completeness of the information given on the Drawings with regard to existing facilities.
- C. In the case where the Contractor discovers an obstruction not indicated on the Drawings or not described via specification reference, then the Contractor shall immediately notify the Architect of the obstructions' existence.
- D. The Architect will determine if the obstruction is to be relocated or removed.
- E. Compensation for this extra work will be paid for in accordance with the provisions in the Contract for "Extra Work".

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Site access and control of areas outside of site.
- B. Contractor use of the premises.
- C. Contractor storage, parking and deliveries.
- D. Work hours, employee conduct and miscellaneous employee requirements.

1.02 SITE ACCESS AND CONTROL

- A. Contractors shall use the designated entrance to the site as shown on the drawings. If no site entrance is designated, Contractors shall use an entrance designated by the Owner's Construction Representative.
 - 1. The Owner may permit, solely at the Owner's discretion, the temporary use of another entrance for site access.
 - 2. The Owner will only review requests made by the Contractor for an exception to the designated site entrance if made in writing at least 72 hours in advance of each of the times desired for use.
- B. All contractors to maintain the entrance area clear of materials, vehicles and any other obstacle or debris. Failure to do so will result in a minimum back charge of \$750 per occurrence.
- C. The area around the site is a residential neighborhood. The Owner intends to be a good neighbor. Contractors shall not close any road for any period in time. The Contractors shall take whatever measures are necessary to not cause any inconvenience to the area's residents
- D. All Contractors are responsible to employ methods to prevent construction materials and/or debris from leaving the site. All Contractors are responsible to routinely monitor the areas surrounding the site during the day as well as at the end of the work-day and to immediately clean up any area to its previous condition.
- E. The Contractors shall employ methods to prevent the transmission of dirt from vehicles driving on exposed areas of the site from reaching the surrounding roadways. The Contractors will be responsible to immediately clean the roadway, should the measures being taken by the Contractors not satisfactorily control the transmission of any dirt to the roadway.
- F. Any damages to areas outside the site, spills of soil, liquid, or any other material shall immediately be repaired, cleaned and restored to its previous condition.
- G. The Contractors shall comply with all state and local requirements for allowable weight limits of vehicles on all roads.
- H. The Owner reserves the right to back charge the Contractors for all costs associated with maintaining the grounds as well as maintaining areas outside the site, which may be disturbed by the Contractors should the Contractors fail to maintain or repair the aforementioned in a condition acceptable to the Owner.

1.03 CONTRACTOR USE OF THE PREMISES

- A. Premises, for the purpose of this Contract, shall mean the site, buildings and other structures located within the property line or in any temporary or permanent construction easements identified on the plans.

- B. The Contractors shall use and manage the premises and the associated construction activities as follows:
1. To not hinder the Owner's ability to operate their facilities.
 2. To allow other Prime Contractors to install their work and complete their contractual obligations in the time period specified.
 3. To allow for stockpiling of construction material and debris without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
 4. To allow for the stockpiling of excavated soil and imported fill, when called for, without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
 5. To allow utility companies to install their work.
 6. To allow for the delivery of equipment and materials by independent trucking companies by leaving enough space for backing in and out of areas.
 7. To allow for the safe, unimpeded travel way of the Owners vehicles, Owner's Construction Representative's vehicles, Architect's vehicles, construction vehicles and heavy construction equipment about the entire site.
- C. Contractors shall maintain the premises in a safe condition throughout the construction period. Compliance with OSHA regulations and site safety shall be the responsibility of the Contractor as it relates to work of the Contract. The posting of all applicable OSHA safety signs shall be the responsibility of the Contractors.
- D. Contractors shall be responsible for protecting Owner's property. All existing buildings, structures, shrubs, trees, lawn fixtures, sculptures and misc. equipment shall be protected at all times. Any removals or relocation of said objects, if allowed shall be as directed by Owner's Construction Representative.
- E. Contractors shall protect all of the physical structures, property and improvements upon the site from damage by their Work and shall immediately repair or replace damage caused by construction operations, employees or equipment employed by the Contractor. All labor, materials and equipment and outside contractors that are employed by the Owner to repair damage caused by the Contractor shall be billed to the Contractor directly or withheld from money due the Contractor for work already completed.
- F. Immediately remove excess excavated material or relocate to areas on the site requiring placement of fill. Do not stockpile excess material on the site.
- G. The construction site space is limited and it shall be the General Contractor's responsibility to manage the site during the entire construction period with input from all concerned parties as to meeting their needs. Equal consideration of the needs of others with that of the Contractor's shall be provided as judged by the Owner.
- H. Due to the limited site area available for construction, staging areas shall be relocated several times during the various stages of construction. Additional compensation for relocating staging areas, equipment and material storage, and trailers are not to be considered an extra cost to the Contractor as this is an anticipated expense that shall be considered at the time of the bid.
- I. Contractors are responsible for cleaning up their own materials and debris. Failure to maintain a clean work site daily, will result in other performing the work and Contractors being back charged for the cleaning cost plus construction administration fees.
- J. Use of the existing building facilities during construction is prohibited including but not limited to: toilet rooms, telephone and water fountains. Contractors shall be fined (\$250) per occurrence if their employee (or subcontractor's employee) is observed disregarding these rules.

- K. Should it become necessary to access the existing building during construction hours for measurements or other non-disruptive work, the contractor shall be escorted by an Owner's Construction Representative.
- L. Do not discard or dispose of any waste on-site.
- M. Open fires will not be permitted on the site.
- N. The Sitework Contractor shall employ erosion control measures to protect wetlands located adjacent to the work where shown on the Drawings and as required by regulatory agencies.
- O. Install erosion control measures as indicated in the Contract. The Contractor shall confine stormwater runoff to the site.

1.04 CONTRACTOR STORAGE, PARKING AND DELIVERIES

- A. Contractors must provide exterior storage containers when required. Final location of storage container shall be determined by the Owner.
- B. Do not unreasonably encumber the premises with materials and equipment. Do not store material in existing buildings. Store all equipment and materials to allow the Owner's employees to operate and conduct their business safely.
- C. Confine premise storage areas to locations designated by the Owner. Immediately repair or replace damaged facilities to the satisfaction of the Owner and to a condition that existed before the damage occurred as determined by preconstruction photographs, or if photographs are unavailable, to that deemed by the Owner.
- D. No materials storage will be permitted within the buildings at any time during construction.
- E. Storage of chemicals and paint materials shall be outside the existing or new structures and shall follow manufacturer's storage/handling guidelines.
- F. Compressed gas containers shall be properly stored and secured per OSHA, to the satisfaction of the Owner. Failure to do so will result in a \$250 back charge, per occurrence.
- G. Contractors shall provide minimum of 48 hours advance written notice to the Owner's Construction Representative for deliveries of materials, site visits by inspectors, manufacturer's representatives or any other occasion that impacts the use of the site. Contractors shall be responsible for any costs that are incurred by the owner, for failure to meet previously agreed upon appointments or work schedules.
- H. Deliveries sent to the Owner will not be signed for or unloaded by the Owner. They will be directed to the construction site and if no employee is on site, the delivery will be rejected, at the contractor's expense.
- I. Night deliveries of equipment (past the designated quitting time) will not be permitted. Do not schedule trucking companies to deliver equipment or wait for the job site to open. Delivery trucks shall not obstruct the site entrance, shall not sit within the neighborhood causing an obstruction or perceived nuisance, nor be left idling on or off the site for any period of time.
- J. Parking shall be in the designated areas of the site only. All automotive type vehicles are to be locked when parked or unattended to prevent unauthorized use. Do not leave vehicles or equipment unattended with the motor running or the ignition key in place. Any vehicles or trucks in non-designated areas may be towed at contractor's expense.

1.05 WORK HOURS, EMPLOYEE CONDUCT AND MISCELLANEOUS EMPLOYEE REQUIREMENTS

- A. The Contractors will be permitted to schedule working days and hours as specified in the General Terms and Conditions, if no times are specified therein then the work hours shall be Monday - Friday 8:00 am - 4:00 pm.
- B. Employees are to act in a professional manner. Any employee using inappropriate language or who is disruptive to the work environment will be banned from the site.
- C. Proper work attire is required. Shirts are to be worn at all times and no short pants are permitted.
- D. Comply with the Owner's Identification and Personal Protection Policies. A copy of the current policy will be distributed at the initial job meeting.
- E. Employees shall not converse with local residents or Owner's employees.
- F. Any employee found under the influence of any drug or alcohol will be banned from the site.
- G. The following items are not allowed on the Site or the Owner's premises. Any person observed to bear any of the following items will be immediately removed from the site.
 - 1. Firearms, ammunition, weapons, and dangerous instruments (other than tools required for the work).
 - 2. Alcoholic beverages or illegal controlled substances.
 - 3. Cameras (except with written permission from the Owner).
- H. Smoking is not permitted within the building except for outdoors at least 100 feet from any window, louver, or door. Comply with the Owner's policies relating to smoking at the Site.
- I. The Contractors shall schedule working days and hours as specified. The contractor shall pay all excess costs for working beyond the times specified. This includes the cost of the owner's employees to keep the building/site open and/or the cost of the additional services for the construction manager.

1.06 UNIFORM SAFETY STANDARDS

- A. Section 155.5 Uniform Safety Standards for School Construction and Maintenance Projects
Disclaimer: These Rules of the Regents and Regulations of the Commissioner of Education ("regulations") are unofficial, and are presented for general informational purposes as a public service. Although reasonable efforts have been made to ensure that these regulations are current, complete and accurate, the State Education Department does not warrant or represent that they are current, complete and accurate. These regulations are subject to change on a regular basis. Readers are advised to consult Title 8 of the Official Compilation of Codes, Rules and Regulations of the State of New York (8 NYCRR), published by the Department of State, and the State Register <http://www.dos.state.ny.us/info/register.htm> for the official exposition of the text of these regulations, as well as for amendments and any subsequent changes or revisions thereto.
- 1. Monitoring of construction and maintenance activities.
 - a. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy and shall be monitored during construction or maintenance activities for safety violations by school district personnel. It is the responsibility of the board of education or board of cooperative educational services to assure that these standards are continuously maintained when the building or any portion thereof is occupied.

- b. Investigation and disposition of complaints relating to health and safety received as a result of construction and maintenance activities.
 - 1) Boards of education and boards of cooperative educational services shall follow procedures established under section 155.4(d)(7) of this Part.
- c. Pre-construction testing and planning for construction projects.
 - 1) Boards of education and boards of cooperative educational services shall assure that proper planning is made for safety of building occupants during construction. For all construction projects for which bids are issued on or after September 30, 1999, such boards shall assure that safety is addressed in the bid specifications and contract documents before contract documents are advertised for bid. All school areas to be disturbed during renovation or demolition shall be tested for lead and asbestos. Appropriate procedures to protect the health of building occupants shall be included in the final construction documents for bidding.
 - 2) Boards of education and boards of cooperative educational services shall establish procedures for involvement of the health and safety committee to monitor safety during school construction projects. The health and safety committees in school districts other than in cities with one million inhabitants or more shall be expanded during construction projects to include the project architect, construction manager, and the contractors. Such committee shall meet periodically to review issues and address complaints related to health and safety resulting from the construction project. In the case of a city school district in a city of one million inhabitants or more, the board of education shall submit procedures for protecting health and safety during construction to the commissioner for approval. Such procedures shall outline methods for compliance with this section.
 - 3) The district emergency management plan shall be updated to reflect any changes necessary to accommodate the construction process, including an updated emergency exit plan indicating temporary exits required due to construction. Provisions shall be made for the emergency evacuation and relocation or release of students and staff in the event of a construction incident.
 - 4) Fire drills shall be held to familiarize students and staff with temporary exits and revised emergency procedures whenever such temporary exits and revised emergency procedures are required.
- d. Pre-construction notification of construction projects.
 - 1) The board of education or board of cooperative educational services shall establish procedures for notification of parents, staff and the community in advance of a construction project of \$10,000 or more to be conducted in a school building while the building is occupied. Such procedures shall provide notice at least two months prior to the date on which construction is scheduled to begin, provided that in the case of emergency construction projects, such notice shall be provided as far in advance of the start of construction as is practicable. Such notice shall include information on the district's obligations under this section to provide a safe school environment during construction projects. Such notice requirement may be met by publication in district newsletters, direct mailings, or holding a public hearing on the project to inform parents, students, school personnel and community members.
- e. General safety and security standards for construction projects.
 - 1) All construction materials shall be stored in a safe and secure manner.
 - 2) Fences around construction supplies or debris shall be maintained.
 - 3) Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
 - 4) During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.
 - 5) Workers shall be required to wear photo identification badges at all times for identification and security purposes while working at occupied sites.

- f. Separation of construction areas from occupied spaces.
 - 1) Construction areas which are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.
 - 2) A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students or school staff.
 - 3) Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
 - 4) All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.
- g. Maintaining exiting and ventilation during school construction projects.
 - 1) The following information shall be included in all plans and specifications for school building projects:
 - (a) A plan detailing how exiting required by the applicable building code will be maintained during construction. The plan shall indicate temporary construction required to isolate construction equipment, materials, people, dust, fumes, odors, and noise during the construction period. Temporary construction details shall meet code-required fire ratings for separation and corridor enclosure. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.
 - (b) A plan detailing how adequate ventilation will be maintained during construction. The plan shall indicate ductwork which must be rerouted, disconnected, or capped in order to prevent contaminants from the construction area from entering the occupied areas of the building. The plan shall also indicate how required ventilation to occupied spaces affected by construction will be maintained during the project.
- h. Fire and hazard prevention.
 - 1) Areas of buildings under construction that are to remain occupied shall maintain a certificate of occupancy. In addition, the following shall be strictly enforced:
 - (a) No smoking is allowed on public school property, including construction areas.
 - (b) During construction daily inspections of district occupied areas shall be conducted by school district personnel to assure that construction materials, equipment or debris not block fire exits or emergency egress windows.
 - (c) Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.
- i. Noise abatement during construction and maintenance activities.
 - 1) Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken. Noise level measurements (dba) shall be taken with a type 2 sound level meter in the occupied space in a location closest to the source of the noise. Complaints regarding excessive noise shall be addressed through the health and safety committee. The district should anticipate those times when

- construction noise is unacceptable and incorporate "no work" periods into the bid specifications.
- j. Control of chemical fumes, gases, and other contaminants during construction and maintenance projects.
 - 1) The bid specifications and construction contracts for each construction project shall indicate how and where welding, gasoline engine, roofing, paving, painting or other fumes will be exhausted. Care must be taken to assure fresh air intakes do not draw in such fumes.
 - 2) The bid specifications shall require schedules of work on construction and maintenance projects which include time for off-gassing of volatile organic compounds introduced during construction before occupancy is allowed. Specific attention is warranted for activities including glues, paint, furniture, carpeting, wall coverings, and drapery. Manufacturers shall be contacted to obtain information regarding appropriate temperatures and times needed to cure or ventilate the product during use and before safe occupancy of a space can be assured. Building materials or furnishings which off-gas chemical fumes, gases, or other contaminants shall be aired out in a well ventilated heated warehouse before it is brought to the project for installation or the manufacturer's recommended off-gassing periods must be scheduled between installation and use of the space. If the work will generate toxic gases that cannot be contained in an isolated area, the work must be done when school classes and programs are not in session. The building must be properly ventilated and the material must be given proper time to cure or off-gas before re-occupancy.
 - 3) Manufacturer's material safety data sheets (MSDS) shall be maintained at the site for all products used in the project. MSDS must be provided to anyone who requests them. MSDS indicate chemicals used in the product, product toxicity, typical side effects of exposure to the product and safe procedures for use of the product.
 - k. Asbestos abatement protocols.
 - 1) All asbestos abatement projects shall comply with all applicable Federal and State laws including but not limited to the New York State Department of Labor industrial code rule 56 (12 NYCRR 56), and the Federal Asbestos Hazard Emergency Response Act (AHERA), 40 CFR part 763 (Code of Federal Regulations, 1998 Edition, Superintendent of Public Documents, U.S. Government Printing Office, Washington, DC 20402; 1998; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). Large and small asbestos projects as defined by 12 NYCRR 56 shall not be performed while the building is occupied. Minor asbestos projects defined by 12 NYCRR 56 as an asbestos project involving the removal, disturbance, repair, encapsulation, enclosure or handling of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material may be performed in unoccupied areas of an occupied building in accordance with the above referenced regulations.
 - l. Lead paint.
 - 1) Any construction or maintenance operations which will disturb lead based paint will require abatement of those areas pursuant to protocols detailed in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" (June 1995; U.S. Department of Housing and Urban Development, Washington, D.C. 20410; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). All areas scheduled for construction as well as areas of flaking and peeling paint shall be tested for the presence of lead and abated or encapsulated in accordance with the above noted guidelines.
 - m. Radon.

- 1) Districts shall take responsibility to be aware of the geological potential for high levels of radon and to test and mitigate as appropriate. This information is available from the New York State Department of Health Radon Measurement Database.
- n. Post construction inspection.
 - 1) The school district or board of cooperative educational services shall provide the opportunity for a walk-through inspection by the health and safety committee members to confirm that the area is ready to be reopened for use.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. SED Commissioner's Uniform Safety Standards - Section 155.5
- B. Contractor use of the premises.

1.02 SITE ACCESS AND CONTROL

- A. Contractors shall use the designated entrance to the site as shown on the drawings. If no site entrance is designated, Contractors shall use an entrance designated by the Owner's Construction Representative.
 - 1. The Owner may permit, solely at the Owner's discretion, the temporary use of another entrance for site access.
 - 2. The Owner will only review requests made by the Contractor for an exception to the designated site entrance if made in writing at least 72 hours in advance of each of the times desired for use.
- B. All contractors to maintain the entrance area clear of materials, vehicles and any other obstacle or debris. Failure to do so will result in a minimum back charge of \$750 per occurrence.
- C. The area around the site is a residential neighborhood. The Owner intends to be a good neighbor. Contractors shall not close any road for any period in time. The Contractors shall take whatever measures are necessary to not cause any inconvenience to the area's residents
- D. All Contractors are responsible to employ methods to prevent construction materials and/or debris from leaving the site. All Contractors are responsible to routinely monitor the areas surrounding the site during the day as well as at the end of the work-day and to immediately clean up any area to its previous condition.
- E. The Contractors shall employ methods to prevent the transmission of dirt from vehicles driving on exposed areas of the site from reaching the surrounding roadways. The Contractors will be responsible to immediately clean the roadway, should the measures being taken by the Contractors not satisfactorily control the transmission of any dirt to the roadway.
- F. Any damages to areas outside the site, spills of soil, liquid, or any other material shall immediately be repaired, cleaned and restored to its previous condition.
- G. The Contractors shall comply with all state and local requirements for allowable weight limits of vehicles on all roads.
- H. The Owner reserves the right to back charge the Contractors for all costs associated with maintaining the grounds as well as maintaining areas outside the site, which may be disturbed by the Contractors should the Contractors fail to maintain or repair the aforementioned in a condition acceptable to the Owner.

1.03 CONTRACTOR USE OF THE PREMISES

- A. Premises, for the purpose of this Contract, shall mean the site, buildings and other structures located within the property line or in any temporary or permanent construction easements identified on the plans.
- B. The Contractors shall use and manage the premises and the associated construction activities as follows:
 - 1. To not hinder the Owner's ability to operate their facilities.

2. To allow other Prime Contractors to install their work and complete their contractual obligations in the time period specified.
 3. To allow for stockpiling of construction material and debris without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
 4. To allow for the stockpiling of excavated soil and imported fill, when called for, without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
 5. To allow utility companies to install their work.
 6. To allow for the delivery of equipment and materials by independent trucking companies by leaving enough space for backing in and out of areas.
 7. To allow for the safe, unimpeded travel way of the Owners vehicles, Owner's Construction Representative's vehicles, Architect's vehicles, construction vehicles and heavy construction equipment about the entire site.
- C. Contractors shall maintain the premises in a safe condition throughout the construction period. Compliance with OSHA regulations and site safety shall be the responsibility of the Contractor as it relates to work of the Contract. The posting of all applicable OSHA safety signs shall be the responsibility of the Contractors.
- D. Contractors shall be responsible for protecting Owner's property. All existing buildings, structures, shrubs, trees, lawn fixtures, sculptures and misc. equipment shall be protected at all times. Any removals or relocation of said objects, if allowed shall be as directed by Owner's Construction Representative.
- E. Contractors shall protect all of the physical structures, property and improvements upon the site from damage by their Work and shall immediately repair or replace damage caused by construction operations, employees or equipment employed by the Contractor. All labor, materials and equipment and outside contractors that are employed by the Owner to repair damage caused by the Contractor shall be billed to the Contractor directly or withheld from money due the Contractor for work already completed.
- F. Immediately remove excess excavated material or relocate to areas on the site requiring placement of fill. Do not stockpile excess material on the site.
- G. The construction site space is limited and it shall be the General Contractor's responsibility to manage the site during the entire construction period with input from all concerned parties as to meeting their needs. Equal consideration of the needs of others with that of the Contractor's shall be provided as judged by the Owner.
- H. Due to the limited site area available for construction, staging areas shall be relocated several times during the various stages of construction. Additional compensation for relocating staging areas, equipment and material storage, and trailers are not to be considered an extra cost to the Contractor as this is an anticipated expense that shall be considered at the time of the bid.
- I. Contractors are responsible for cleaning up their own materials and debris. Failure to maintain a clean work site daily, will result in other performing the work and Contractors being back charged for the cleaning cost plus construction administration fees.
- J. Use of the existing building facilities during construction is prohibited including but not limited to: toilet rooms, telephone and water fountains. Contractors shall be fined (\$250) per occurrence if their employee (or subcontractor's employee) is observed disregarding these rules.
- K. Should it become necessary to access the existing building during construction hours for measurements or other non-disruptive work, the contractor shall be escorted by an Owner's Construction Representative.

- L. Do not discard or dispose of any waste on-site.
- M. Open fires will not be permitted on the site.
- N. The Sitework Contractor shall employ erosion control measures to protect wetlands located adjacent to the work where shown on the Drawings and as required by regulatory agencies.
- O. Install erosion control measures as indicated in the Contract. The Contractor shall confine stormwater runoff to the site.

1.04 CONTRACTOR STORAGE, PARKING AND DELIVERIES

- A. Contractors must provide exterior storage containers when required. Final location of storage container shall be determined by the Owner.
- B. Do not unreasonably encumber the premises with materials and equipment. Do not store material in existing buildings. Store all equipment and materials to allow the Owner's employees to operate and conduct their business safely.
- C. Confine premise storage areas to locations designated by the Owner. Immediately repair or replace damaged facilities to the satisfaction of the Owner and to a condition that existed before the damage occurred as determined by preconstruction photographs, or if photographs are unavailable, to that deemed by the Owner.
- D. No materials storage will be permitted within the buildings at any time during construction.
- E. Storage of chemicals and paint materials shall be outside the existing or new structures and shall follow manufacturer's storage/handling guidelines.
- F. Compressed gas containers shall be properly stored and secured per OSHA, to the satisfaction of the Owner. Failure to do so will result in a \$250 back charge, per occurrence.
- G. Contractors shall provide minimum of 48 hours advance written notice to the Owner's Construction Representative for deliveries of materials, site visits by inspectors, manufacturer's representatives or any other occasion that impacts the use of the site. Contractors shall be responsible for any costs that are incurred by the owner, for failure to meet previously agreed upon appointments or work schedules.
- H. Deliveries sent to the Owner will not be signed for or unloaded by the Owner. They will be directed to the construction site and if no employee is on site, the delivery will be rejected, at the contractor's expense.
- I. Night deliveries of equipment (past the designated quitting time) will not be permitted. Do not schedule trucking companies to deliver equipment or wait for the job site to open. Delivery trucks shall not obstruct the site entrance, shall not sit within the neighborhood causing an obstruction or perceived nuisance, nor be left idling on or off the site for any period of time.
- J. Parking shall be in the designated areas of the site only. All automotive type vehicles are to be locked when parked or unattended to prevent unauthorized use. Do not leave vehicles or equipment unattended with the motor running or the ignition key in place. Any vehicles or trucks in non-designated areas may be towed at contractor's expense.

1.05 WORK HOURS, EMPLOYEE CONDUCT AND MISCELLANEOUS EMPLOYEE REQUIREMENTS

- A. The Contractors will be permitted to schedule working days and hours as specified in the General Terms and Conditions, if no times are specified therein then the work hours shall be Monday - Friday 8:00 am - 4:00 pm.
- B. Employees are to act in a professional manner. Any employee using inappropriate language or who is disruptive to the work environment will be banned from the site.
- C. Proper work attire is required. Shirts are to be worn at all times and no short pants are permitted.
- D. Comply with the Owner's Identification and Personal Protection Policies. A copy of the current policy will be distributed at the initial job meeting.
- E. Employees shall not converse with local residents or Owner's employees.
- F. Any employee found under the influence of any drug or alcohol will be banned from the site.
- G. The following items are not allowed on the Site or the Owner's premises. Any person observed to bear any of the following items will be immediately removed from the site.
 - 1. Firearms, ammunition, weapons, and dangerous instruments (other than tools required for the work).
 - 2. Alcoholic beverages or illegal controlled substances.
 - 3. Cameras (except with written permission from the Owner).
- H. Smoking is not permitted within the building except for outdoors at least 100 feet from any window, louver, or door. Comply with the Owner's policies relating to smoking at the Site.
- I. The Contractors shall schedule working days and hours as specified. The contractor shall pay all excess costs for working beyond the times specified. This includes the cost of the owner's employees to keep the building/site open and/or the cost of the additional services for the construction manager.

1.06 UNIFORM SAFETY STANDARDS - SECTION 155.5 - UNIFORM SAFETY STANDARDS FOR SCHOOL CONSTRUCTION AND MAINTENANCE PROJECTS.

Disclaimer: These Rules of the Regents and Regulations of the Commissioner of Education ("regulations") are unofficial, and are presented for general informational purposes as a public service. Although reasonable efforts have been made to ensure that these regulations are current, complete and accurate, the State Education Department does not warrant or represent that they are current, complete and accurate. These regulations are subject to change on a regular basis. Readers are advised to consult Title 8 of the Official Compilation of Codes, Rules and Regulations of the State of New York (8 NYCRR), published by the Department of State, and the State Register external link for the official exposition of the text of these regulations, as well as for amendments and any subsequent changes or revisions thereto.

- A. Monitoring of construction and maintenance activities.
 - 1. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy and shall be monitored during construction or maintenance activities for safety violations by school district personnel. It is the responsibility of the board of education or board of cooperative educational services to assure that these standards are continuously maintained when the building or any portion thereof is occupied.

- B. Investigation and disposition of complaints relating to health and safety received as a result of construction and maintenance activities.
 - 1. Boards of education and boards of cooperative educational services shall follow procedures established under section 155.4(d)(7) of this Part.(c) Pre-construction testing and planning for construction projects.
 - a. Boards of education and boards of cooperative educational services shall assure that proper planning is made for safety of building occupants during construction. For all construction projects for which bids are issued on or after September 30, 1999, such boards shall assure that safety is addressed in the bid specifications and contract documents before contract documents are advertised for bid. All school areas to be disturbed during renovation or demolition shall be tested for lead and asbestos. Appropriate procedures to protect the health of building occupants shall be included in the final construction documents for bidding.
 - b. Boards of education and boards of cooperative educational services shall establish procedures for involvement of the health and safety committee to monitor safety during school construction projects. The health and safety committees in school districts other than in cities with one million inhabitants or more shall be expanded during construction projects to include the project architect, construction manager, and the contractors. Such committee shall meet periodically to review issues and address complaints related to health and safety resulting from the construction project. In the case of a city school district in a city of one million inhabitants or more, the board of education shall submit procedures for protecting health and safety during construction to the commissioner for approval. Such procedures shall outline methods for compliance with this section.
 - c. The district emergency management plan shall be updated to reflect any changes necessary to accommodate the construction process, including and be i updated emergency exit plan indicating temporary exits required due to construction. Provisions shall be made for the emergency evacuation and relocation or release of students and staff in the event of a construction incident.
 - d. Fire drills shall be held to familiarize students and staff with temporary exits and revised emergency procedures whenever such temporary exits and revised emergency procedures are required.
- C. Pre-construction testing and planning for construction projects.
 - 1. The board of education or board of cooperative educational services shall establish procedures for notification of parents, staff and the community in advance of a construction project of \$10,000 or more to be conducted in a school building while the building is occupied. Such procedures shall provide notice at least two months prior to the date on which construction is scheduled to begin, provided that in the case of emergency construction projects, such notice shall be provided as far in advance of the start of construction as is practicable. Such notice shall include information on the district's obligations under this section to provide a safe school environment during construction projects. Such notice requirement may be met by publication in district newsletters, direct mailings, or holding a public hearing on the project to inform parents, students, school personnel and community members.
- D. General safety and security standards for construction projects.
 - 1. All construction materials shall be stored in a safe and secure manner.
 - 2. Fences around construction supplies or debris shall be maintained.
 - 3. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
 - 4. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.

5. Workers shall be required to wear photo identification badges at all times for identification and security purposes while working at occupied sites.
- E. Separation of construction areas from occupied spaces.
1. Construction areas which are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.
 - a. A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students or school staff.
 - b. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
 - c. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session.
- F. Maintaining exiting and ventilation during school construction projects.
1. The following information shall be included in all plans and specifications for school building projects:
 - a. A plan detailing how exiting required by the applicable building code will be maintained during construction. The plan shall indicate temporary construction required to isolate construction equipment, materials, people, dust, fumes, odors, and noise during the construction period. Temporary construction details shall meet code-required fire ratings for separation and corridor enclosure. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.
 - b. A plan detailing how adequate ventilation will be maintained during construction. The plan shall indicate ductwork which must be rerouted, disconnected, or capped in order to prevent contaminants from the construction area from entering the occupied areas of the building. The plan shall also indicate how required ventilation to occupied spaces affected by construction will be maintained during the project.
- G. Fire and hazard prevention.
1. Areas of buildings under construction that are to remain occupied shall maintain a certificate of occupancy. In addition, the following shall be strictly enforced:
 - a. (1) No smoking is allowed on public school property, including construction areas.
 - b. (2) During construction daily inspections of district occupied areas shall be conducted by school district personnel to assure that construction materials, equipment or debris not block fire exits or emergency egress windows.
 - c. (3) Proper operation of fire extinguishers, fire alarm, and smoke/fire detection systems shall be maintained throughout the project.
- H. Noise abatement during construction and maintenance activities.
1. Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken. Noise level measurements (dba) shall be taken with a type 2 sound level meter in the occupied space in a location closest to the source of the noise. Complaints regarding excessive noise shall be addressed through the health and safety committee. The district should anticipate those

times when construction noise is unacceptable and incorporate “no work” periods into the bid specifications.

- I. Control of chemical fumes, gases, and other contaminants during construction and maintenance projects.
 - 1. The bid specifications and construction contracts for each construction project shall indicate how and where welding, gasoline engine, roofing, paving, painting or other fumes will be exhausted. Care must be taken to assure fresh air intakes do not draw in such fumes.
 - a. The bid specifications shall require schedules of work on construction and maintenance projects which include time for off-gassing of volatile organic compounds introduced during construction before occupancy is allowed. Specific attention is warranted for activities including glues, paint, furniture, carpeting, wall coverings, and drapery. Manufacturers shall be contacted to obtain information regarding appropriate temperatures and times needed to cure or ventilate the product during use and before safe occupancy of a space can be assured. Building materials or furnishings which off-gas chemical fumes, gases, or other contaminants shall be aired out in a well ventilated heated warehouse before it is brought to the project for installation or the manufacturer's recommended off-gassing periods must be scheduled between installation and use of the space. If the work will generate toxic gases that cannot be contained in an isolated area, the work must be done when school classes and programs are not in session. The building must be properly ventilated and the material must be given proper time to cure or off-gas before re-occupancy.
 - b. Manufacturer's material safety data sheets (MSDS) shall be maintained at the site for all products used in the project. MSDS must be provided to anyone who requests them. MSDS indicate chemicals used in the product, product toxicity, typical side effects of exposure to the product and safe procedures for use of the product.
- J. Asbestos abatement protocols.
 - 1. All asbestos abatement projects shall comply with all applicable Federal and State laws including but not limited to the New York State Department of Labor industrial code rule 56 (12 NYCRR 56), and the Federal Asbestos Hazard Emergency Response Act (AHERA), 40 CFR part 763 (Code of Federal Regulations, 1998 Edition, Superintendent of Public Documents, U.S. Government Printing Office, Washington, DC 20402; 1998; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). Large and small asbestos projects as defined by 12 NYCRR 56 shall not be performed while the building is occupied. Minor asbestos projects defined by 12 NYCRR 56 as an asbestos project involving the removal, disturbance, repair, encapsulation, enclosure or handling of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material may be performed in unoccupied areas of an occupied building in accordance with the above referenced regulations.
- K. Lead paint.
 - 1. Any construction or maintenance operations which will disturb lead based paint will require abatement of those areas pursuant to protocols detailed in the “Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing” (June 1995; U.S. Department of Housing and Urban Development, Washington, D.C. 20410; available at the Office of Facilities Planning, Education Building Annex, Room 1060, State Education Department, Albany, NY 12234). All areas scheduled for construction as well as areas of flaking and peeling paint shall be tested for the presence of lead and abated or encapsulated in accordance with the above noted guidelines.
- L. Radon.

1. Districts shall take responsibility to be aware of the geological potential for high levels of radon and to test and mitigate as appropriate. This information is available from the New York State Department of Health Radon Measurement Database.
- M. Post construction inspection.
 1. The school district or board of cooperative educational services shall provide the opportunity for a walk-through inspection by the health and safety committee members to confirm that the area is ready to be reopened for use.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Allowance pricing for the following items:
 - 1. Contingency Account.
- B. This Section covers the requirements for use of the cash allowances listed above contained in the proposal (Bid Forms, Price Schedule) and included in the Contract Price bid by the Contractor and defines and stipulates the charges that will be paid for out of the stipulated allowances.
- C. The Contractor shall include the cash allowances stipulated in this Section in the amount bid (Base Bid).
- D. Eligible costs described in this Section, and Sections referenced herein, will be the only costs paid for out of the stipulated allowances.
- E. All other costs associated with the project as specified and/or shown, including but not limited to the delivery, installation and all Contractor overhead and/or collateral expenses are to be distributed among the other portions of the work and shall be included in the lump sum base bid.

1.02 SUBMITTALS

- A. Make all submissions under the provisions of Section 013300.
- B. For each type of product/material specified to be furnished under allowance pricing provide documentation of the unit pricing on manufacturer's letterhead certifying pricing of the product/material.
- C. Submit additional backup information to substantiate the invoiced amount(s) as the Architect may require for review and approval, prior to order or payment of item.
- D. Provide written breakdowns for extra work as the Owner may require.

1.03 CHANGES TO STIPULATED (CASH) ALLOWANCE

- A. If the actual cost of services differs from the cash allowance, then the Contract Price will be adjusted accordingly.

1.04 PAYMENTS TO BE MADE OUT OF CONTINGENCY ACCOUNT

- A. Include the cash allowance as shown in the proposal, in the amount bid for use upon the Owner's instructions.
- B. The Owner will draw funds from the contingency account only upon prior written approval by the Owner's Construction Field Representative and Architect.
- C. Funds remaining at project closeout shall be credited to the Owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section specifies the requirements for measurements and records made for payment purposes and describes the item(s) under which payment(s) will be made for the Work performed under this Contract.
- B. All work shown or specified in the Contract Documents shall be performed.
- C. Items not specified to be measured or paid for (for which no specific pay item exists in the Price Schedule) shall be included in an appropriate unit price item or in a lump-sum item.
- D. Comply with the requirements pertaining to the restoration of all surfaces, which may or may not be paid for under a separate unit price item, and which shall be restored to a condition equal to or better than that existed prior to work starting under this contract.

1.02 MEASUREMENT REQUIREMENTS

- A. All required measurements shall be made by the Contractor with the Architect.
- B. Any measurements not witnessed by Architect and which cannot be verified or substantiated by Architect will not be approved and payment under the item(s) requiring such measurements will not be made.
- C. Coordinate measurements monthly, for the preparation of periodic pay estimates.
- D. Where payments will be made for removing rock and existing materials, notify Architect so that he may witness the measurements.
 - 1. All materials removed without conforming to the above procedures, which Architect cannot verify or substantiate, will not be paid for.
 - 2. Maintain complete, neat, clean, and legible field notes for all measured items.
 - 3. Notes shall contain spaces for Contractor's and Architect's signatures plus additional space for comments.
 - 4. An original and a carbon copy shall be made for all notes and one copy shall be turned over to Architect daily.
 - 5. The Architect's signature shall not be constituted as an acceptance of the work, or the measurements made, but shall mean that he was present when the measurements were made.

1.03 SUBMITTALS

- A. Field notes of all measurements for payment purposes delivered to Architect daily.
- B. Copies of all invoices required for payments out of cash allowance(s).
- C. Monthly Applications for Payment.
- D. Record Drawings showing the locations and quantities of all items measured for payment purposes.

1.04 SCHEDULING

- A. Notify Architect, as far in advance as possible, of the recording of measurements so that a representative of the Architect may observe existing conditions, work being performed, and measurements being made.

- B. Allow for and afford Architect ample time, space, and equipment to observe measurements and to verify measurements and elevations.

PART 2 - PRODUCTS**2.01 GENERAL**

- A. Provide all labor, materials, facilities, levels, measuring devices and all other equipment and items necessary to properly and accurately perform all measurements for payment purposes.
- B. Payment for certain items not specifically listed in the bid forms but otherwise required by the technical specifications shall be deemed included as part of the General Conditions and the individual unit price and lump sum bid items provided for in the proposal.

PART 3 - EXECUTION**3.01 GENERAL**

- A. Perform all measuring required under this Section.
- B. Record all measurements and calculated quantities on the Record Drawings.
- C. No measurement shall be made for work performed within the limits of Lump Sum Items.

ITEM NO.	ITEM DESCRIPTION
1	

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Submission procedures.
- B. Documentation of changes to Contract Sum/Price and Contract Time.

1.02 RELATED SECTIONS

- A. Proposal Form.
- B. Other sections referencing this section.
- C. All contractual requirements outlined in the documents.

1.03 SUBMISSION REQUIREMENTS

- A. Submit Alternates on Proposal Forms identifying the effect on adjacent or related components.
- B. Alternates will be reviewed and accepted or rejected at the Owner's option.
- C. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.04 SELECTION AND AWARD OF ALTERNATES

- A. Indicate variation of Bid Price for Alternates listed on the PROPOSAL FORM. This form requests a "difference" in Bid Price by adding to or deducting from the base Bid Price.
- B. Alternates quoted on PROPOSAL FORM will be reviewed and accepted or rejected at Owner's option.
- C. Accepted alternates will be identified in Owner-Contractor Agreement.
- D. Bids will be evaluated on the base bid price, plus any combination of alternate items.

1.05 WORK FOR ALTERNATES

- A. Work for alternate items selected shall include all related materials, labor, equipment and operations necessary to conduct and complete the alternate work and all other affected work or adjacent areas.
- B. There shall be no change in time or completion date for the selected alternates, unless specified herein or approved in writing by the Architect and Owner.
- C. Alternates and associated work shall meet all standards and specifications delineated in the Contract Documents.
- D. Contractor shall coordinate pertinent related Work and modify surrounding Work as required to complete the project under each alternate selected by the Owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 PROCEDURES

- A. Work for each alternate, related items and collateral work shall be completed in their entirety.
- B. If alternate items are not selected, work for the base bid and collateral work shall be completed in their entirety.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. **This Section includes the requirements for substitution of specified products during construction.**
- B. *The Architect will consider requests for substitutions only within **two (2)** business days following the Bid Opening.*
- C. Products named by the Bidder, at the time of bid, shall be furnished and installed and substitutions will not be considered by the Owner/Architect for those products.

1.02 CONTRACTOR'S OPTIONS

- A. For products specified only by reference standard, select any product meeting that standard.
- B. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with the Specifications.
- C. Where products are not named, then submit products that meet the specifications.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

- A. Name - The Drawings and Specifications list acceptable manufacturers, commercial names, trademarks, brands and other product, material and equipment designations. Such names are provided to establish the required type, quality and other salient requirements of procurement.
- B. Equals - An item equal to that named or described on the Drawings or in the Specifications may be provided by Contractor if accepted in writing by the Architect.
- C. A request for product substitution constitutes a representation that the Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 - 2. Shall provide the same warranty for the Substitution as for the specified Product.
 - 3. Shall coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner, including extra charges by other Prime Contractors, material suppliers, and vendors.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. May be responsible to reimburse the Owner for review or redesign services associated with re-approval by authorities, if required.
 - 6. May be responsible to reimburse the Owner for all additional A/E services needed by the Architect for extra services associated with the review of the Contractor's substituted item since it could not have been originally included in the Architect's professional engineering services agreement. Reimbursement shall be based on the man-hours expended, at current billing rates. A copy of the billing rates will be provided to the contractor for approval prior to services being provided.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- E. Substitution Submittal Procedure:

1. The Contractor shall submit three (3) copies of the REQUEST FOR SUBSTITUTION FORM for consideration including all required information.
 2. The Contractor shall use the form included within this Section.
 3. All forms shall be type written.
 4. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
- F. The burden to prove product equivalence rests on the Contractor.
- G. The Architect will notify Contractor in writing of decision to accept or reject request and at that time the Contractor can make a formal submittal in accordance with the requirements contained in Section 013300.
- H. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor or the Architect.

PART 3 - EXECUTION

NOT USED

This space left intentionally blank.

REQUEST FOR SUBSTITUTION FORM

Project: RENOVATIONS AT ROCHAMBEAU Substitution Request Number: _____
ALTERNATIVE HIGH SCHOOL

Contractor: _____

Address: _____

To: _____ Date: _____

H2M Project Number: WPSD2401 Owner: WHITE PLAINS CITY SCHOOL
DISTRICT

Contract Name: _____ Contract No.: _____

Specification Title: _____

Section: _____ Page: _____ Article/Paragraph: _____

Drawing No(s): _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____

Trade Name: _____ Phone #: (____) _____

Installer: _____ Address: _____

Phone #: (____) _____

History: ___ New product ___ 2-5 years old ___ 5-10 years old ___ More than 10 years old

Differences between proposed substitution and specified product:

___ Point-by-point comparative data attached

Reason for not providing specified item (Attach separate sheet if necessary):

Typical Similar Installation:

Project: _____

Engineer / Architect: _____

Address: _____

Owner: _____

Date Installed: _____

Submit complete installation list on separate sheets.

Proposed substitution affects other parts of Work: ☐ No ☐ Yes

Explain: _____

Gross Savings to Owner for accepting substitution: \$ _____

Proposed substitution changes Contract Time: ☐ No ☐ Yes

Add / deduct (circle): _____ days

Supporting data attached for evaluation of the proposed substitution:

☐ Product Data ☐ Photos ☐ Drawings ☐ Tests ☐ Reports ☐ Samples☐ Other (explain): _____

Attached data includes description, specifications, drawings, photographs, performance and test data adequate for evaluation of request; applicable portions of data are clearly identified.

Attached data also includes a description of changes to Contract Documents that proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. Proposed Substitution has been fully checked and coordinated with Contract Documents.
2. Proposed Substitution does not affect dimensions shown on Drawings.
3. Proposed Substitution does not require revisions to any other Prime Contractor's work.
4. The undersigned will pay for changes to building design, including Architectural and Engineering design, detailing, and construction costs caused by requested Substitution.
5. Proposed Substitution will have no adverse affect on other trades, construction schedule, or specified warranty requirements.
6. Maintenance and service parts will be locally available for proposed substitution.
7. The undersigned further states that the function, appearance, and quality of proposed Substitution are equivalent or superior to specified item.

This request for product substitution also constitutes a representation that I, as the Contractor:

1. Has investigated proposed Product and determined that it meets or exceeds the quality of the specified Product.
2. Shall provide the same warranty for the Substitution as for the specified Product.
3. Shall coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner, including extra charges by other Prime Contractors, material suppliers, and vendors.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Shall reimburse the Owner and the Architect for review or redesign services associated with re-approval by authorities.
6. Shall reimburse the Owner for all additional engineering services claimed by the Architect for extra services associated with the review of the Contractor's substituted item since it could not have been originally included in the Architect's professional engineering services agreement. Reimbursement shall be based on the man-hours expended, at current billing rates.

Contractor's Authorized Representative (Typewritten): _____

Authorized Signature: _____

Date: _____

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work under this Section specifies the procedures used to process partial payments and the Final Payment Request.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements governing each prime contractor's Applications for Payment.
 - 1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Schedules: The Contractor's Construction Schedule and Submittal Schedule are specified in Division 01 - Section 013300 - SUBMITTALS.

1.03 TIME FOR COMPLETION

- A. Inasmuch as the provisions of the Contract relating to the time for performance and completion of the Work are for the purposes of enabling the Owner to proceed with the construction of a public improvement in accordance with a predetermined program, and inasmuch as failure to complete the Work within the period herein specified may result in damage or loss to the Owner, time is of the essence of the Contract.
- B. Time for completion of the Work shall be in accordance with that stipulated in the Contract Documents.
- C. The date for completion will be calculated from the date shown on the Notice to Proceed. The Contractor shall execute the Work with diligence from day to day, and complete it within the time fixed.
- D. For the purpose of defining the date of substantial completion, the Project will be considered complete when all Work covered by the Contract has been performed and all installations and equipment have been tested and are ready for permanent use. Contractor shall provide a copy of the final Certificate of Occupancy from the AHJ prior to issuance of the final payment. Removal of the Contractor's plant and equipment and other minor adjustments which do not prevent use of the Project will not be a factor in establishing the date of substantial completion.
- E. Notwithstanding the foregoing, the Architect will establish the date of substantial completion when the project is accepted and ready for operation, and no large or major items of work are as yet outstanding. At such time, the Architect will issue a punch list, itemizing the items of work remaining. The punch list will include "minor" items only, as defined solely by the Architect. Any prior punch lists, which include "major" or significant items, as defined by the Architect, shall not be a criterion in establishing the date of substantial completion.

1.04 PARTIAL COMPENSATION

- A. At the Owner's discretion, the Contractor may receive compensation for materials and products delivered to the site yet not installed providing:
 - 1. A canceled check or paid bill from the supplier is submitted to the Architect indicating that the Contractor has paid the supplier for the material or equipment.
 - 2. The material or piece of equipment is properly stored and protected from the elements and/or vandalism in accordance with the manufacturer's written requirements for long term storage.

3. A certificate of insurance is provided for the material or piece of equipment in the event of a fire, vandalism, theft, etc.
 4. A bill of material is delivered to the Architect at the time of delivery itemizing the subject material or equipment. Payment will be made for on-site material and/or equipment in the amount of 80% of the gross amount of the paid invoice. This payment will be subject to the normal retainage of the partial estimate.
 5. The Architect has agreed to the pre-purchasing of the materials.
- B. The Contractor may not receive compensation for materials and products stored in the Contractor's yard or shop unless permitted by the Owner.

1.05 SCHEDULE OF VALUES

- A. Coordination: Contractor shall coordinate preparation of its Schedule of Values for the Work with preparation of the Contractors' Construction Schedule.
1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. Contractor's Construction Schedule.
 - b. Application for Payment forms, including Continuation Sheets.
 - c. List of subcontractors.
 - d. Schedule of allowances.
 - e. Schedule of alternates.
 - f. Schedule of submittals.
 2. Submit the Schedule of Values (SOV) to the Owner's Construction Representative within 10 days of receipt of Letter of Intent but no later than 10 days before the date scheduled for submittal of the initial Applications for Payment. (SOV received after the 15 day of the month, will not be accepted for review until the following month to allow for computer system input time required by the Owner's Construction Representative and the Owner.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one item for each Specification Section.
1. Identification: Include the following Project Identification on the Schedule of Values:
 - a. Project name and location. (Each school and additions / renovations will require separate breakdown sections and front end with subtotals.
 - b. Name of the Architect.
 - c. Architect's Project Number.
 - d. Contractor's name and address.
 - e. Date of Submittal.
 2. 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 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 Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items where requested by Owner's Construction Representative. Multiple line items will be provided for amounts in excess of five percent of the contract sum, broken out into sub

components equating not greater than five percent each. Separate all line items by material & labor.

- a. Breakdown shall be separated between additions and renovations with subtotals for each.
4. In addition to the breakdown of specification sections, separate line items will be required for the following front-end line items:
 - a. Bonds & OCP insurances shall have separate line items. (substantiation letters shall be required from bonding & insurance company for any amounts higher than industry standard). Only OCP insurance shall be allowed for the insurance line item. All other insurance costs must be distributed by contractor throughout the various sections.
 - b. Supervision: include a minimum of one percent of contract value.
 - c. Project Administration: include a minimum of one percent of contract value.
 - d. Project meetings (appropriate value for weekly attendance for entire duration of project - see Section 013119 Project Meetings).
 - e. Punchlist - include a minimum of two (2) percent of contract sum.
 - f. Closeout: separate lines for demobilization, Operation & Maintenance manuals, closeout paperwork and Demonstration & Training. All totaling a minimum two (2) percent of the Contract value.
 - g. Continuous Clean-up and Final Clean-up values each at a minimum of one half percent (0.5 % of the Contract value).
 - h. The General Construction Contractor shall add a line item for broom sweep/ damp mopping at an agreed to value.
5. Round amounts to nearest whole dollar; the total shall equal the Contract Value.
6. Provide a separate line item in the Schedule of Values (SOV) 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. Include requirements for insurance and bonded warehousing.
7. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.
9. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin 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 expenses, at the discretion of the Contractor.
10. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Value.

1.06 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
 1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- B. Payment-Application Times: Each progress-payment date is indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

- C. Payment-Application Times: The date for each progress payment is the 21st day of each month (or as designated by the Owner). The period covered by each Application for Payment is the previous month.
- D. Payment-Application Forms: Use AIA Document G732/CMA (include line for Owner's Construction Representative signature) and Continuation Sheets G703 as the form for Applications for Payment.
 - 1. Separate Continuation Sheets shall be provided for work which takes place on each building, which will detail that portion of the contract which is attributable to the specific building. The appropriate S.E.D. project number(s) shall be shown on the top of each continuation form.
- E. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Owner's Construction Representative will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Allowances issued prior to the last day of the construction period covered by the application. (No Change order or Allowance requisitions can be made or listed on the requisition, unless the formal Change Order and Allowance paperwork has been fully executed by Contractor, Owner's Construction Representative, Architect and Owner).
 - 3. Provide copies of payrolls which are signed and notarized documenting compliance with prevailing wage laws. Payrolls for contractors are required from the of the previous month to the 24th day of the current month. Payrolls for subcontractors are required from the 15th day of the previous month to the 14th day of the current month.
 - 4. Provide copies of Lien Waivers for the previous payment (or anticipated payment). Include certificate of monthly payment for subcontractors for the previous month.
 - 5. Provide OSHA 10 certificates for all workers on site.
 - 6. Payment for stored materials (whether on-site but not installed, or offsite in a secured warehouse) will require a Bill of Lading showing the exact value accompanied by photographs of the actual materials. In no case shall more than 80% be approved for uninstalled stored materials. An Insurance certificate must be provided, specific to the materials stored with the appropriate dollar value (for on-site or offsite materials).
- F. Transmittal: Submit five (5) signed and notarized original copies of each Application for Payment to the Owner's Construction Representative by a method ensuring receipt within 24 hours. Each copy shall be complete and securely attached and shall include all waivers of lien, certified payrolls and similar attachments.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Architect and Owner's Construction Representative.
- G. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers for the construction period covered by the previous application.
 - 1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - a. Submit final Applications for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

4. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.
- H. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment include the items listed below. The initial payment application will not be processed until all of these actions and submittals have been received by the Owner's Construction Representative. When preliminary submissions are received with the initial application (item 4 and item 7 listed below), the final submission for these items must be received and approved by the Owner's Construction Representative prior to submission of the second application for payment.
1. List of subcontractors.
 2. List of principal suppliers and fabricators.
 3. Schedule of Values.
 4. Contractor's Construction Schedule (preliminary if not final).
 5. Schedule of principal products.
 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 governing authorities for performance of the Work.
 12. Initial progress report.
 13. Report of preconstruction meeting.
 14. Certificates of insurance and insurance policies.
 15. Performance and payment bonds.
 16. Data needed to acquire the Owner's insurance.
 17. Initial settlement survey and damage report, if required.
- I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

1.07 ACCEPTANCE OF FINAL PAYMENT REQUEST

- A. The Contractor shall be conclusively deemed to have accepted the Final Payment Request as a correct statement of the total liability of the Owner and of the compensation paid and to be paid to the Contractor by the Owner unless within seven (7) days after delivery of his copy of the Final Payment Request to him, the Contractor shall return such copy to the Owner together with a statement of his objections to such request and of any claim for damages or compensation in excess of the amounts shown on the Request. The acceptance by the Contractor of the Final Payment Request approved by the Owner shall constitute a release and shall discharge the Owner from all further claims by the Contractor arising out of or relating to the Contract, including but not limited to, a release from all impact costs.

1.08 SCOPE OF PAYMENTS

- A. The Contractor shall receive and accept the compensation as herein provided, in full payment for furnishing all materials, labor, tools, and equipment and for performing all work contemplated and embraced under the Contract, also for all loss or damage arising out of the nature of the Work or from the action of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered during the prosecution of the Work, and for all risks of every description connected with the prosecution of the Work, until its final acceptance by the Owner, also for all expenses incurred by, or in consequence of, the suspension or discontinuance of the said prosecution of the Work as herein specified, and for all actual or alleged infringements of patent, trademark, or copyright, and for completing the Work and the whole hereof, in an acceptable manner, according to the Plans, Specifications, and other Contract Documents. The

SECTION 012900 - PAYMENT PROCEDURES **H2M**

payment of any partial or final estimate shall in no way or in no degree prejudice or affect the obligation of the Contractor, at his own cost and expense, to renew or replace all defects and imperfections, or damages. The Architect shall be the judge, and the said Contractor shall be liable to the Owner for failure so to do.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Schedule of Values

1.02 SCHEDULE OF VALUES

- A. Submit for approval prior to the start of the work a Schedule of Values that indicates a breakdown of the labor, materials and equipment and other costs used in the preparation of the bid. This schedule shall be in sufficient detail to indicate separate figures for such items as excavation, concrete, equipment and all other items making up the lump sum price. The cost breakdown shall be separately itemized for each lump sum bid item in the project.
- B. Where the cost breakdown includes items for bond payment, insurance payment, job set-up, or job mobilization, these items will be paid based on paid invoices and copies of cancelled checks.
- C. Submit a Schedule of Values to the Architect for review and approval within fifteen (15) calendar days from the date shown on the Notice to Proceed.

1.03 FORM OF SUBMITTAL

- A. Submit typewritten Contract Cost Breakdown on AIA Form G703 - Application and Certificate for Payment Continuation Sheet or EJCDC 1910-8-E. The Architect reserves the right to revise the form or provide a form prepared by the Architect.
- B. Use the Table of Contents of the Contract Specifications as a basis for format for listing costs of work for Sections under Divisions 01-48 as sections apply to work. Not all Sections need be assigned a breakout price as determined by the Architect.
- C. Identify each line item with number and title as listed in Table of Contents.
- D. Provide dollar values for each line item for labor, overhead, profit, material, and equipment components for each category of work if requested by the Architect.
- E. List quantities of materials specified under unit price allowances.
- F. The Schedule of Values, after approval by the Architect, shall be the basis for the Contractor's Application for Payment.
- G. The first Application for Payment will not be reviewed prior to an approved breakdown.

1.04 PREPARATION OF SCHEDULE OF VALUES

- A. In addition to the above, provide a separate line item cost for each of the following items which shall be supported by proof where requested by Architect:
 - 1. Performance and payment bonds.
 - 2. Insurance.
 - 3. Mobilization and Demobilization (Amounts shall be equal in value).
 - 4. Temporary facilities and measures as specified in Section 015000.
 - 5. Project Coordination Meetings as specified in Section 013100.
 - 6. Preparation of the Project Construction Schedule, and updates, as specified in Section 013216.
 - 7. Preparation of Weekly Schedules as specified in Section 013100

8. Rubbish removal and daily cleaning up. (Provide a total dollar amount and a daily rate for each calendar day during the contract period.)
 9. All Cash Allowance items as contained in Section 012100.
 10. On-site, full time superintendent starting on the date of the Notice To Proceed and ending on the date that all punch list items are completed, which for the purposes of the Schedule of Values, shall be the contract completion date.
 11. Final cleaning.
- B. Show total costs including overhead and profit.
- C. Provide additional details and data to substantiate the cost breakdown as requested by the Architect.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes:
 - 1. Requests for Interpretation or for information
 - 2. Administration of subcontracts
 - 3. Communication and coordination requirements
- B. Site staffing requirements for the Contractor's superintendent are also specified herein, the costs for which shall be included in the Contract price.

1.02 REQUEST FOR INTERPRETATION OR INFORMATION

- A. The Contractor shall use the Request for Interpretation/Information Form included within this Section when the Contractor feels that additional information is needed to perform the work of the Contract.
- B. The Architect will respond to requests utilizing the form provided herein.
- C. The Architect's verbal response(s) to the Contractor's formal requests, if provided, shall not constitute an official response and if acted upon by the Contractor are done so at the Contractor's own risk and liability and shall not be subject to claims for additional compensation.
- D. A signed facsimile of the form will be accepted. The original of the form must be signed and provided to the project manager.
- E. The Architect will respond in writing to the request as soon as possible.

1.03 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report recording the following information concerning events at the site, and submit one copy to the Owner's Construction Representative by 10:00 a.m. the following day. Any contractor not submitting required reports will not receive approval of the subsequent application for payment until such time that all required information is submitted:
 - 1. List of subcontractors at the site.
 - 2. Count and names of personnel at the site.
 - 3. High and low temperatures, general weather conditions.
 - 4. Accidents and unusual events.
 - 5. Meetings and significant decisions.
 - 6. Stoppages, delays, shortages, and losses.
 - 7. Meter readings and similar recordings.
 - 8. Emergency procedures.
 - 9. Orders and requests of governing authorities.
 - 10. Change Orders received, implemented.
 - 11. Services connected, disconnected.
 - 12. Equipment or system tests and startups.
 - 13. Partial Completions, occupancies.
 - 14. Substantial Completions authorized.

1.04 SUBCONTRACTOR ADMINISTRATION AND COORDINATION

- A. Terms and conditions of the Contract shall be binding upon each subcontractor.
- B. Furnish each subcontractor and major equipment vendor at least one (1) copy of the Plans and Technical Specifications.

- C. Provide at least one (1) copy of each approved shop drawing to each subcontractor whose work may depend upon the contents of the shop drawing submittal. The Owner reserves the right to stop all work, without claims for delay, until such time as appropriate subcontractors are furnished with appropriate shop drawings.
- D. Each Contractor shall sequence and schedule the work of subcontractors. Coordinate construction and administration activities of subcontractors. The Architect and Owner will not accept telephone calls, facsimiles or office visits from any subcontractors on the project. Subcontractor and vendor questions and clarifications shall be directed to the Architect by the Contractor.
- E. The Contractor's on-site project superintendent shall inspect all the work of all of his/her subcontractors, as it is being constructed. The Contractor's subcontractor shall not be permitted to do any work on the site without the Contractor's job site superintendent also being there to inspect the work as it is being performed.

1.05 UTILITY COORDINATION

- A. Comply with the requirements of 16 NYCRR Part 753 - Protection of Underground Facilities. Submit a letter stating the case number.
- B. Comply with the utility coordination requirements contained in the General Conditions.

1.06 PUBLIC/PRIVATE UTILITIES

- A. Notify all public and private utilities in accordance with Article 20, Section 322-a of the New York State General Business Law for location and markout of existing utilities in the vicinity of the work.
- B. Repair all utilities damaged during the Work to the standards and approval of the respective utility at no cost to the Owner.

1.07 CONTRACTOR'S JOB SITE SUPERINTENDENT

- A. Each Contractor shall employ an on-site superintendent as specified herein below. He/She shall be a full-time employee of the Contractor.
- B. Each Contractor shall name the job site superintendent within five (5) days of the Notice To Proceed. A letter to the Architect shall be provided.
- C. He/She shall have the authority to sequence and schedule the work, and to staff the project, so as not to interfere with the work by others and to complete the work daily within the time so required.
- D. Each Superintendent shall have a minimum of five (5) years of experience as a job site superintendent for projects of equal size and complexity.
- E. Each superintendent shall be qualified to perform the duties so required to successfully complete the work in accordance with the Contract Documents.
- F. Each superintendent shall speak English. If required by the Architect, provide a resume for the proposed superintendent that shall be typed and shall list the qualifications of the superintendent. Prior to the Contractor assigning a superintendent to the project, he may wish to arrange an interview with the Architect to determine the proposed superintendent's ability to properly coordinate the work through the Owner/Architect. The Contractor shall employ a superintendent acceptable to the Owner.

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REQUEST FOR INTERPRETATION/INFORMATION (RFI)

OWNER'S NAME: WHITE PLAINS CITY SCHOOL DISTRICT

PROJECT NAME & CONTRACT DESIGNATION: RENOVATIONS AT ROCHAMBEAU
ALTERNATIVE HIGH SCHOOL

CONSTRUCTION CONTRACT NO.: WPSD2401

Product, Item, or System:		
Request Date:		RFI No.:
Specification Section:		Paragraph Ref:
Contract Drawing Reference(s):		
Describe Request:		
Signed:	See Contractor's Attachments for Additional Description for Information	
Owner/Architect Response:		
Architect (Printed):	See Architect's Attachments for Additional Information	
Architect's Signature & Date	<i>Response Accepted By Contractor</i> <i>Contractor's Signature & Date</i>	
<p>The Work shall be carried out in accordance with these supplemental instructions without change in Contract amount or Contract time for completion. Prior to proceeding with these instructions, indicate your acceptance of these instructions by signing where indicated and returning this form to the Architect.</p>		

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes the requirements for progress meetings, including but not limited to, the following:
 - 1. Preconstruction conferences.
 - 2. Preinstallation conferences.
 - 3. Progress meetings.
 - 4. Coordination meetings.

1.02 PRE-CONSTRUCTION CONFERENCE

- A. A preconstruction conference will be scheduled before starting construction, at a time convenient to the Owner, Owner's Construction Representative and the Architect, but no later than 15 days after issuance of the Letter of Intent. The conference will be held at the Project Site or another convenient location.
- B. Attendees: Authorized representatives of the Construction Manager, Owner, Architect, and their consultants; the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and be authorized to speak/make decisions, on behalf of the concern they represent, on matters relating to the Work.
 - 1. Agenda: Discuss items of significance that could affect progress, including the following:
 - 2. Tentative construction schedule.
 - 3. Critical work sequencing.
 - 4. Designation of responsible personnel.
 - 5. Procedures for processing field decisions and Change Orders.
 - 6. Procedures for processing Applications for Payment.
 - 7. Distribution of Contract Documents.
 - 8. Submittal of Shop Drawings, Product Data, and Samples.
 - 9. Preparation of record documents.
 - 10. Use of the premises.
 - 11. Parking availability.
 - 12. Office, work, and storage areas
 - 13. Equipment deliveries and priorities.
 - 14. Safety procedures.
 - 15. First aid.
 - 16. Security.
 - 17. Housekeeping.
 - 18. Working hours.
- C. Reporting: The Owner's Construction Representative shall set-up the meeting(s), prepare and issue meeting minutes to attendees and interested parties.

1.03 PREINSTALLATION CONFERENCES

- A. Contractor shall conduct a pre-installation conference at the Project Site before each construction activity that requires coordination with other construction activities / trade work.
- B. Attendees: The Installer and representatives of the Prime Contractor, 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 the Owner's Construction Representative and Architect of scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Shop Drawings, Product Data, and quality-control samples.
 - g. Review of mockups. Possible conflicts.
 - h. Compatibility problems.
 - i. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's recommendations.
 - l. Warranty requirements. Compatibility of materials. Acceptability of substrates. Temporary facilities.
 - m. Space and access limitations.
 - n. Governing regulations. Safety.
 - o. Inspecting and testing requirements. Required performance results.
 - p. Recording requirements Protection.
2. Prime Contractor shall record significant discussions, agreements and disagreements of each conference and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.
3. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest possible date.
4. Reporting: Prime Contractor or Installer shall issue meeting minutes to attendees, Owner's Construction Representative, Owner and Architect and associated field representatives.

1.04 PROGRESS MEETINGS

- A. Progress meetings will be held at the Project Site at regular intervals (typically weekly) as determined by the Owner's Construction Representative and Architect.
- B. Attendees: In addition to representatives of the Owner, Owner's Construction Representative, and the Architect, each Prime Contractor shall be represented at these meetings. Attendance is mandatory at weekly meetings and contractor will include in their bid a sum of \$250.00 per meeting (figure 10 meetings) to have an authorized individual in attendance capable of making decisions and providing direction. This amount will be listed as a separate line item on the contractors Schedule of Values. If the contractor misses a meeting without prior written authorization from the Owner's Construction Representative, they will be issued a deduct change order in the amount of \$250.00 per occurrence. Subcontractors, suppliers, or other entities will be invited at the discretion of the Owner, Owner's Construction Representative, and the Architect. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.
 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.

2. Review the present and future needs of each entity present, including the following:
 - a. Interface requirements. Time.
 - b. Sequences.
 - c. Status of submittals. Deliveries.
 - d. Off-site fabrication problems. Access.
 - e. Site utilization.
 - f. Temporary facilities and services.
 - g. Hours of work.
 - h. Hazards and risks.
 - i. Housekeeping.
 - j. Quality and work standards. Change Orders.
 - k. Documentation of information for payment requests.
- D. Reporting: Approximately 5 days after each meeting, Owner's Construction Representative will prepare and distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
- E. At least seven (7) calendar days advance notice will be given by the Owner's Construction Representative or the date for the upcoming meeting will be set during the progress meeting.
- F. Attendance at progress meetings shall be mandatory. An amount of \$1,000 shall be deducted from the Contract Amount for each announced meeting not attended by the Contractor.
- G. The owner, a partner, or a corporate officer representing the Contractor shall attend each announced progress meeting. The job site superintendent and office project manager for each Contractor shall also attend.
- H. Subcontractors shall attend when requested by the Owner or Owner's Construction Representative at no cost to the Owner.
- I. Meetings will be conducted by Owner's Construction Representative at a location selected by the Owner, normally at or adjacent to the project site.
- J. The minimum agenda will cover:
 1. Review minutes of previous meetings.
 2. Identify present problems and resolve them.
 3. Plan work progress during next work period.
 4. Review the status of off-site fabrication and delivery schedule.
 5. Review shop drawings and submittal schedules.
 6. Review change order status.
 7. Review status of construction progress schedule.
 8. Coordinate access requirements.
 9. Other business related to the work.
 - 10.

1.05 COORDINATION MEETINGS

- A. Conduct project coordination meetings at regular intervals convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

- C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- D. The Owner's Construction Representative Field Manager will conduct daily meetings with the prime contractors and major subcontractors foremen. The purpose of the meetings is to provide the opportunity for each contractor to communicate to the Field Manager any items relating to their respective construction activity for that day (request for shutdown, deliveries, etc.) The meetings will commence from 7:00 o'clock am until 7:30 o'clock am. These meetings are generally informal. The Owner's Construction Representative Field Manager will keep minutes of these meetings when appropriate and will be available upon request.

1.06 SAFETY MEETINGS

- A. Each Contractor will be responsible to conduct their own safety meetings on a regular basis (but not less than four times during any thirty day period.)
- B. Minutes of the Safety Meeting must be maintained by each contractor on-site and must be made available upon request. Failure to conduct and submit meeting minutes will be grounds to reject the Prime Contractor's progress payment.

1.07 CONDUCTING MEETINGS

- A. General - This paragraph covers Owner, Owner's Construction Representative, and Architect meetings with Contractor and/or his subcontractors. Neither the Owner nor the Owner's Construction Representative nor the Architect wish to meet solely with a subcontractor and requests for such meetings will be discouraged. If a meeting is deemed necessary, every effort will be made to have Contractor attend. If, for some reason, circumstances do not allow such, the meeting may be held, minutes of the meeting will be sent to contractor and decisions on any major questions will be reserved until contractor has been consulted. Subcontractors may accompany contractor to meetings provided the contractor notifies the Owner's Construction Representative in advance.
- B. Chairman - When Owner's Construction Representative/Owner attend meetings, the Owner's Construction Representative, or his duly authorized representative, will act as chairman. Should Owner-Contractor meetings be necessary, Owner will chair such meetings.
- C. Notices - Owner's Construction Representative or Owner will issue notices of meetings to all parties concerned and will note, thereof, who must attend and who may attend if they so desire. When a Contractor desires a formal meeting, make a request through Owner's Construction Representative. Except when Owner's Construction Representative determines that a prompt meeting is essential, all notices will be issued at least one week in advance of the meeting date.
- D. Agenda - All parties shall inform Owner's Construction Representative of items desired to be discussed and Owner's Construction Representative will notify all parties of all items to be considered. This is to allow each party to fully prepare for the meeting. This shall not be construed to mean that other items cannot be brought up at the meetings.
- E. Time Limits - It is the intent to hold productive and efficient meetings and to keep them as short as is reasonably possible. The Chairman will be the sole judge as to whether or not further discussion on any matter is warranted and all discussions shall cease when he so orders.
- F. Minutes - Minutes of meetings will be kept, written and distributed by the Chairman or his duly authorized representative. Minutes of all meetings will be available upon request to the Chairman.

- G. Conduct - It is the intent to conduct all meetings in an orderly manner, to reasonably discuss all items and to hear and observe the rights and opinions of all parties. The Chairman will allow each party to speak, however, he reserves the right to order any individual to leave the meeting at any time for any reason.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 013216 - CONSTRUCTION SCHEDULE^{H2M}

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies the requirements for preparing construction schedules and for keeping them up to date.

1.02 CONSTRUCTION SCHEDULE - GENERAL

- A. The Contractor shall develop a full schedule, in sufficient detail and clarity of for and technique so that the contractor can plan and control his work properly and the Owner's Construction Representative, Owner, and Architect can each readily monitor and follow the progress for all portions of the work. The Contractor shall complete the detailed schedule within 10 days after contract award.
- B. In no case shall first application for payment be approved prior to submission of acceptable preliminary schedule, detailed submittal schedule, and schedule of values.
- C. Monthly updates, required schedules and graphics shall be submitted to the Owner's Construction Representative/Owner within five working days following the end of the preceding month. Monthly updates, schedules and graphics shall be submitted in five copies.
- D. If any of the required submissions are returned to the Contractor for corrections or revisions, they shall be resubmitted within ten (10) calendar days after the return mailing date. Re-submittals shall be in the same quantities as noted above. Review and response by the Owner's Construction Representative/Owner will be given within (10) calendar days after resubmission.
- E. The schedule shall comply with the various limits imposed by the scope of work any by any contractually intermediate milestone dates and completion dates included in the contract.
- F. The activities identified in the schedule shall be analyzed in detail to determine activity time durations in units of whole working days. All durations listed shall be the result of definitive manpower and resource planning by the Contractor. The contractor will provide specific manpower loading information / crew size to support the duration proposed. (e.g. - 4 man crew can produce 1000 sq. ft. / day, project has 11,000 sq. ft., thus duration is identified as 11 days)
- G. The activity data shall include activity codes to facilitate selection, sorting and preparation of summary reports and graphics. Activity codes shall be developed for:
 - 1. Area: Subdivision of the site into logical modules or blocks and levels.
 - 2. Responsibility: Contractor or subcontractor responsible for the work.
 - 3. Specifications: CSI format - 48 Division.
 - 4. System: Division of the work into building systems for summary purposes.
 - 5. Milestone: Work associated with completion of interim completion dates or milestones.
 - 6. Pay Item: Work identified with a pay item listed on the approved Schedule of Values.
- H. Coordinate the work and maintain the construction schedule. In the event actual progress begins to lag the schedule, promptly employ additional means and methods of construction to make up the lost time.
- I. Keep the construction schedule current and revise and resubmit as often as necessary to accurately reflect the conditions of the work, past progress and anticipated future progress.
- J. The construction schedule shall be completed, submitted, and deemed received by the Architect prior to the first payment application.

- K. The schedule, when approved by the Owner's Construction Representative, Owner, and Architect, shall establish the dates for starting and completing work for the various portions of the Contract. It shall be the duty of the Contractor to conform to his/her own schedule and to perform the work within the time limits indicated. Failure to adhere to the approved schedule may expose the Contractor to disputes, claims and additional costs incurred by others.
- L. Coordinate letting of subcontracts, material purchases, shop drawing submissions, delivery of materials, and sequence of operations, to conform to the schedule.
- M. Coordinate the construction schedule with the proposed schedules of the equipment suppliers and subcontractors.
- N. The schedule shall show the critical sequence items where new units must come online before existing facilities go offline, if applicable to the project. The schedule shall also show, in detail, the proposed sequence of the work and the estimated date of starting and completing each stage of the work in order to complete the project within the contract time.
- O. The schedule shall be plotted out in color and shall be 11-inch by 17-inch. It shall contain as many sheets as are necessary to show all rolled down tasks. Partially printed schedules will not be accepted. Each Contractor shall arrange to have it plotted on a color plotter suitable for the intended application.
- P. Prepare the schedule in a manner so that the actual progress of the work can be recorded and compared with the expected progress.
- Q. The schedule shall use the following convention:
 - 1. Tasks for the General Contractor in blue ink.
 - 2. Task links/task dependency in blue ink.
 - 3. Work by others in green ink.
 - 4. Milestone dates (zero duration) by a red diamond.
 - 5. The end date for each task and subtask at the end of a bar.
 - 6. The description of all major tasks within the bar. The bar shall be red.
 - 7. Critical path.
- R. The construction schedule shall also show the following:
 - 1. Critical sequence items where new units must come on-line before existing facilities go off-line, if applicable to the project.
 - 2. Computer delivery, if so specified elsewhere.
 - 3. Telephone service and high speed internet cable installation.
 - 4. Lead time for control panels that are packaged as systems.

1.03 REPORTS

- A. For initial submittal and each update the contractor shall prepare the following standard report:
 - 1. Tabular Schedule Report sorted by Activity code and Early Start.

1.04 GRAPHICS

- A. For initial submittal the contractor shall prepare the following graphics:
 - 1. Pure logic diagram (Precedence Format) of all data, not time scaled, grouped by Activity code.
 - 2. Detailed bar chart sorted by Activity Code with Early Start and Early Finish.
 - 3. Summary bar chart summarizing by Activity Code with Early Start and Early Finish.
- B. For each update the contractor shall prepare the following graphic:

SECTION 013216 - CONSTRUCTION SCHEDULE **H2M**

1. Bar Chart showing work activities with Early Start in the next 40 work-days sorted by Activity Code and Early Start.
 2. Summary Bar Chart summarizing by Activity Code showing progress with Early Start and Early Finish.
- C. For each Change Order involving adjustment in the contract time for performance, the contractor shall prepare a pure logic diagram showing the changed work with all preceding (predecessors) and succeeding (successors) activities (fragnet schedule).

1.05 SUBMITTALS

- A. In no case shall first application for payment be approved prior to submission of acceptable preliminary schedule, detailed submittal schedule, and schedule of values.
- B. Monthly updates, required schedules and graphics shall be submitted to the Owner's Construction Representative and Owner within five working days following the end of the preceding month. Monthly updates, schedules and graphics shall be submitted in five copies.
- C. If any of the required submissions are returned to the Contractor for corrections or revisions, they shall be resubmitted within ten (10) calendar days after the return mailing date. Resubmittal shall be in the same quantities as noted above. Review and response by the Owner's Construction Representative and Owner will be given within (10) calendar days after resubmission.

1.06 PAYMENT WITHHELD

- A. If the Contractor fails to submit the required schedule information as indicated in this section within the time stipulated or provide revision(s) thereof within the requested time, the Owner and Owner's Construction Representative may withhold approval of Progress Payment Estimates until such time as the Contractor submits the required information.

1.07 REVISION OF PROJECT PROGRESS SCHEDULE

- A. Each Prime Contractor shall evaluate and provide updated construction schedules monthly in accordance with job requirements. Each update shall be submitted to the Owner and Owner's Construction Representative for information purposes and be provided by the last Friday of every month.
- B. Each Contractor shall modify its construction schedule to accommodate coordination of the construction contracts by the Owner/Architect without claims for additional compensation or delay.
- C. The Owner's Construction Representative will provide an electronic version of the Final Combined Construction Schedule for use in keeping the schedule up to date.
- D. From time to time, and at stages deemed appropriate by the Owner's Construction Representative, the Owner may issue updated schedules to reflect the project's status. The percent complete for each task may be shown, as determined by the Owner's Construction Representative.

1.08 UPDATES

- A. Updates of the Schedule shall be made at the end of each month reflecting actual or reasonably anticipated progress as of the last working day of the month. Monthly updates of the Detailed Schedule will be made each month until all work is substantially complete.

- B. The Contractor will meet with the Owner's Construction Representative and Owner at the end of the updated period to review information in draft form before preparation of the required schedules and graphics. The Contractor will present data, prepared in advance, for review and approval of the Owner's Construction Representative and Owner including :
 - 1. Actual Start Dates.
 - 2. Actual Completion Dates.
 - 3. Activity percent complete and/or Remaining Duration.
 - 4. Revised logic, changes in activity duration's or resource assignments.
 - 5. Narrative report discussing progress through the update period; changes, delays or other circumstances affecting progress; status of the project with respect to completion schedule; and any efforts by the Contractor to improve progress.
- C. The update meeting will establish the values to be submitted for payment and will be directly related to the schedule of values in the application for payment.
- D. The Contractor shall prepare a report of the meeting and make all changes, additions or corrections to the data resulting from the review. The contractor shall promptly prepare the monthly submittal following the update meeting.

1.09 CHANGES, DELAYS AND EXTENSIONS OF TIME

- A. When changes or delays are experienced, the Contractor shall submit to the Owner's Construction Representative and Owner, a Time Impact Analysis (TIA) illustrating the influence of each change or delay on the currently scheduled Contract completion date. Each Time Impact Analysis shall include a Fragnet (network analysis) demonstrating how the Contractor proposes to incorporate the change or delay into the Detailed Schedule. Additionally, the analysis shall demonstrate the time impact based on the date the change was given to the Contractor, the status of construction at that point in time, and the activity duration of all affected activities. The activity duration used in this Time Impact Analysis shall be those activities included in the latest update of the Detailed Schedule, closest to the time of delay or as adjusted by mutual agreement.
- B. Each TIA shall be submitted within ten (10) calendar days after a delay occurs or a notice of change order is given to the Contractor. In cases where the Contractor does not submit a TIA for a specific change or delay with a specified period of time, it shall be mutually agreed that no time extension is required. Final evaluation of each TIA by the Owner's Construction Representative and Owner shall be made within fourteen (14) calendar days after receipt of the TIA unless subsequent meetings and negotiations are necessary. Adjustments in the Contract time for performance shall be made only by written change order approved by the Owner. Upon approval of the Owner, Fragnets illustrating the influence of changes and delays shall be incorporated into the Detailed Schedule by the contractor during the first update after agreement is reached.
- C. The time difference between the Early Finish date and the Late Finish Date is defined as "float." The "float" belongs to the Project and may be used by the Contractor or the Owner's Construction Representative and Owner to benefit the Project. Changes or delays that influence activities in the network with "float" and do not extend the Critical Path (the network of activities with zero days "float") shall not be justification for an adjustment in Contract time for performance.

SECTION 013216 - CONSTRUCTION SCHEDULE **H2M**

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies the requirements for making submissions for the project. Electronic submissions will be required unless expressly noted otherwise.
- B. Refer to Section 013216 - Construction Schedule for the requirements concerning the submission of construction schedules and for making updates thereto.
- C. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
 - 1. Contractor's construction schedule.
 - 2. Submittal schedule.
 - 3. Daily construction reports.
 - 4. Shop Drawings.
 - 5. Product Data.
 - 6. Samples.
 - 7. Quality assurance submittals.
- D. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
 - 1. Permits.
 - 2. Applications for Payment.
 - 3. Performance and payment bonds.
 - 4. Insurance certificates.
 - 5. List of subcontractors.
- E. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Payment Procedures" specifies requirements for submittal of the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" specifies requirements governing preparation and submittal of required Coordination Drawings.
 - 3. Division 1 Section "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.
 - 4. Division 1 Section "Quality Requirements" specifies requirements for submittal of inspection and test reports.
 - 5. Division 1 Section "Execution and Closeout Requirements" specifies requirements for submittal of Project Record Documents and warranties at project closeout.

1.02 DEFINITIONS

- A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.
 - 1. Preparation of Coordination Drawings is specified in Division 1 Section "Project Management and Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
- B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.
- C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.03 IDENTIFICATION OF SUBMITTALS

- A. Each and every submission shall be provided by the Contractor and shall be accompanied by a SUBMISSION TRANSMITTAL FORM. The Contractor shall use the specimen form made a part of this Section. *Submittals not containing the form will be returned to the Contractor un-reviewed.* The Architect will not review project submissions until such time as the form is completed in its entirety. Identify each submittal and resubmittal using the form.
- B. Each individual submittal shall be identified with a 'submission log number' as specified here in this example: 033000.01-1
 - 1. The Section number for which the submittal applies, followed by a period, shall be indicated, "033000."
 - 2. The submittal within the Section shall be indicated by the next grouping "01". For instance and in this example, the concrete design mix may be submission "01", the waterstop catalog cut may be "02", and so on. Submittals shall be sequentially numbered within the Specification Section, i.e. 01, 02, etc.
 - 3. The number of times the submission was made shall be preceded by a dash and a numerical suffix as follows: "-1". In this example, the concrete design mix is being submitted for the first time. Use the number "1" for the first time it is being submitted.
 - 4. Subsequent submissions of the concrete design mix shall utilize the original number and a sequential numeric suffix, i.e. "2" for a resubmission, "3" for the second resubmission, and so on. Substitute the new number for the original "1".
- C. Where a layout drawing, containing different elements of the project, is being submitted and there is a question as to what the log number might be, then the Contractor shall contact the Architect so that an agreed upon log number can be assigned.
- D. It is incumbent on the Contractor to initially assign the submission log number designation to each submission. Submissions not containing a log number, as specified above, will be returned to the Contractor un-reviewed by the Architect.
- E. Every submittal shall also be accompanied by a Transmittal Letter (or "Speed Form") addressed to the Architect's Project Manager as hereinafter defined.

1.04 SUBMITTAL SCHEDULE

- A. Submittals must be prepared and transmitted as follows, unless otherwise approved by the Owner's Construction Representative:
 - 1. Within 15 working days after Notice to Proceed:
 - a. Doors & Hardware.
 - b. HVAC units.
 - c. Ductwork shop drawings
 - d. Electrical fixtures and panels.
 - e. Asbestos Abatement submittals & Plan.
 - 2. If the contractor misses the milestone submittal timeframes listed above, the owner / agents can withhold requisition payments until the required paperwork is received. If there are any open submittals beyond 60 days of contract award, the owner may withhold contractor payments until all required paperwork is received.
 - 3. Upon approval by the Owner's Construction Representative, non-critical submissions may be transmitted after the above time frame.
 - 4. Prepare submittals including information in accordance with Submittal Identification and Procedures specified in this section.

1.05 COORDINATION OF SUBMITTALS

- A. Prior to submitting to the Owner's Construction Representative, fully coordinate all interrelated work. As a minimum, do the following:
 - 1. Determine and verify all field dimensions and conditions by field measuring existing conditions and the installed work of this Contract and work by others.
 - 2. Coordinate with all trades, subcontractors, vendors, system and equipment suppliers and manufacturers, public agencies, and utility companies and secure all necessary approvals, in writing.
- B. Make submittals in groups containing all associated items that in some way depend upon each other.
 - 1. This also applies to color charts, as one color may not be able to be selected without the selection of other colors so as to form a color-coordinated group.
 - 2. The Owner's Construction Representative may elect not to review partial or incomplete submissions, whereupon he will notify the Contractor of the additional submissions that are required before a review can be made.

1.06 TIMING OF SUBMITTALS

- A. Make submittals far enough in advance of scheduled dates of installation to provide time for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery. The Architect will review submittals in a manner as expedient as possible, and will generally send a written response to the Contractor within seven (7) calendar days of receipt of submittals.
- B. Submissions may be returned reviewed, unreviewed, rejected, returned conditioned upon submission of related items, or for other reasons set forth in the Contract Documents.
- C. Make submissions well in advance as the returning, rejecting or disapproval of submissions or other similar circumstances are possible and are deemed "avoidable delays". Costs for these delays or those attributed to Contractor's tardiness in making submittals shall be borne by the Contractor.
- D. **All** submittals requiring Owner's Construction Representative's review (except operations manuals) as required under the technical specifications of these documents shall be submitted within **FORTY FIVE (45)** consecutive calendar days after the date of the Notice to Proceed. An amount of **\$250** per calendar day shall be deducted from payment due the Contractor for **each** day that an outstanding submittal exists, said amount being the cost associated with the Owner's Construction Representative's review.
- E. Operation and maintenance manuals shall be submitted at least **FORTY FIVE (45)** consecutive calendar days prior to scheduled startup of the unit or system.
- F. If material or equipment is installed before it has been deemed to be in general compliance with the Contract Documents, as determined by the Owner's Construction Representative, the Contractor shall be liable for its removal and replacement at no extra charge and without an increase in contract time.

1.07 DESTINATION OF SUBMITTALS

- A. Each submission of documents shall be accompanied by a transmittal form containing the name of the project, the contract name, the Architect's project manager, a submittal ID number, and a description of content for the submitted items.

- B. A copy of the TRANSMITTAL FORM shall also be provided to the Owner's Construction Representative's inspector at the job site.
- C. Electronic submittals shall be transmitted through the Newforma® Project Center website; a Submittal Exchange website or by email; pending instruction by the Architect. H2M architects + engineers is using a project information application called Newforma® Project Center. One of its components is Newforma Info Exchange, a web application that facilitates sending and sharing transmittals, and file sharing.
- D. As an external team member on this project the Contractor will be required to access the H2M architects + engineers/Newforma Info Exchange website for information related to the project, including file transfers, RFI, Submittals, Action Items, and project Calendar information. The Contractor will have access to this website using any internet-capable computer running Internet Explorer or Firefox. All data transmitted through the H2M architects + engineers/Newforma Info Exchange website is encrypted and logged. Further instructions will be provided to the Contractor after the contract is awarded.
- E. Other submissions, such as material samples or other items as instructed by the Owner's Construction Representative, shall be sent to the Architect's office as follows:
 - H2M architects + engineers
 - 538 Broad Hollow Road, 4th Floor East

Attention: H2M Project Manager (Named at Pre-Construction Conference or in the Notice to Proceed)

1.08 CLARITY OF SUBMITTALS

- A. All printed materials shall be neat, clean, professionally drafted by hand or by computer, clear, legible, and of such quality that they can be easily reproduced by normal photocopying or wide format copy/print machines.
- B. All electronic submittals shall be produced with a minimum resolution of 300 dpi.
- C. Binders of information shall be separated into groups, subsystems, or similar equipment/function. Copies not conforming to this paragraph will be returned to the Contractor without the Owner's Construction Representative's review.

1.09 CONTRACTOR'S REPRESENTATION

- A. By making a submission, the Contractor represents that he has determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving equipment into an enclosed space, materials, catalog and model numbers and similar data and that he has checked and coordinated each submission with other work at or adjacent to the project site in accordance with the requirements contained in Section 013100 - PROJECT MANAGEMENT AND COORDINATION and the Contract Documents.
- B. Every SUBMISSION TRANSMITTAL FORM shall contain the Contractor's approval stamp and date showing that the submittal has been approved by the Contractor. The Owner's Construction Representative will not review submittals that have not yet been reviewed and approved by the Contractor.

1.10 ENGINEER/ARCHITECT'S REVIEW

- A. Owner's Construction Representative will review and comment on each submission conforming to the requirements of this Section.

1. Architect's review will be for conformance with the design concept of the project and will be confined to general arrangement and compliance with the Contract Documents only, and will not be for the purpose of checking dimensions, weights, clearances, fittings, laying lengths, tolerances, interference's, for coordinating the work by others or subcontractors.
 2. The Architect's review of a separate item, or portion of a system, does not represent a review of an assembly or system in which the item functions.
- B. The Architect will mark submittals as follows:
1. NO EXCEPTION TAKEN (A) - No corrections, no marks. The content of this submittal has been reviewed by the Architect and been found to be in general compliance with the Contract Documents. No further submission of this submittal is required and the information contained in the submittal may be built into the work in accordance with the Contract Documents.
 2. MAKE CORRECTIONS NOTED (B) - Minor amount of corrections. The content of this submittal has been reviewed by the Architect and has been found in general to be in compliance with the Contract Documents. The notations made on the submittal by the Architect shall be incorporated into the work in accordance with the terms and conditions of the Contract Documents. No further submission of this submittal is required.
 3. AMEND AND RESUBMIT (C) - The content of this submittal has been reviewed by the Architect and this review has determined that additional data and/or modification to the submitted data or other changes are required to bring the work represented in this submittal into compliance with the Contract Documents. This submittal shall be reviewed and revised in accordance with the Architect's comments and resubmitted to the Architect for review. The information contained on the resubmittal shall not be incorporated into the work until the submittal is returned to the Contractor marked "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED".
 4. REJECTED (D) - The content of this submittal has been reviewed by the Architect and has been determined not to be in accordance with the requirements contained in the Contract Document and requires too many corrections or other justifiable reason. The submittal shall be corrected and resubmitted or a submittal of an alternate shall be provided. No items are to be fabricated under this mark.
 5. SUBMIT SPECIFIED ITEM (E) - The content of this submittal has been reviewed by the Architect and this review has indicated that the work displayed in the submittal is not in compliance with the Contract Documents. The Contractor shall submit another submittal for this portion of the work, which complies with the Contract Documents.
 6. RECEIVED (R) - This submittal is accepted on the project and filed for record purposes only, in accordance with the terms and conditions of the Contract Documents. Documents marked "RECEIVED" will not be returned.
- C. No payment will be made on any item for which a submission is required if such submission:
1. has not been made,
 2. has been made but was not stamped "No Exceptions Taken" by Architect,
 3. has been made and stamped "Make Corrections Noted", but contractor has not complied with Architect's notes marked on the submittal,
 4. has been made and stamped "No Exceptions Taken", but item provided does not conform to the shop drawing nor to the Contract Documents.
- D. Submittals not required by these specifications will not be recognized or processed.
- E. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for re-submittals.
1. Allow between 10 and 15 business days for initial review of the first round of submittals. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.

2. If an intermediate submittal is necessary, process the same as the initial submittal. Allow an additional 10 business days for processing each submittal.
3. No extension of Contract Time will be authorized because of contractor's failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

1.11 RESUBMISSIONS

- A. Prepare new and additional submissions, make required corrections, and resubmit corrected copies until found in compliance with the Contract Documents.
- B. On, or with, re-submittals, clearly describe revisions and changes made, other than the corrections requested by Architect, which did not appear on the previous submissions.

1.12 CONTRACTOR'S RESPONSIBILITIES

- A. Architect's review of submittals shall not relieve the Contractor of his/her responsibility for any deviation from the requirements of the Contract Documents nor relieve the Contractor from responsibility for errors or omissions in the submittals.
- B. No portion of the work requiring a submission shall be commenced until the Architect has found the submission in general compliance with the Contract Documents.
- C. The Contractor shall provide written notification of any specification or drawing deviation.

1.13 EXCESS COSTS FOR ENGINEERING/ARCHITECTURAL SERVICES

- A. The Owner will charge to the Contractor, and will deduct from the partial and final payments due the Contractor, all excess engineering and architectural expenses incurred by the Owner for extra services (work) conducted or undertaken by the Architect as stipulated below:
 1. Services and other similar charges because of the Contractor's errors, omissions, or failures to conform to the requirements of the Contract Documents as related to administrative charges associated with non-compliance with the requirements for making project submissions.
 2. Services and other similar charges required to examine and evaluate any changes or alternates proposed by the Contractor and which may vary from the Contract Documents.
 3. Services and other similar charges as a result of the Contractor's proposed substitution of materials, equipment or products which require a redesign of any portion of the project, as contained in the Contract Documents at the time of bid.
 4. Services and other similar charges as a result of the Contractor's proposed substitution of products which require an engineering and/or architectural evaluation, beyond the time stipulated in Section 012500 - PRODUCT SUBSTITUTION PROCEDURES, to determine if the substituted product is equal to that specified.
 5. Services and other similar charges as a result of changes by the Contractor to dimensions, weights, sizes, voltages, phase, horsepower, materials of construction, and similar physical or operating characteristics of the product furnished which require redesign of the project in any way.
 6. Services and other similar charges for the review of resubmissions of shop drawings that have been marked as "No Exceptions Taken" or "Make Corrections Noted".
 7. Services and other similar charges for the review of shop drawings submitted more than two (2) times for the same product or portion of the work.

1.14 MISCELLANEOUS SUBMITTALS

- A. Provide a Submittal Schedule within seven (7) calendar days from the date of the Notice to Proceed. The Submittal Schedule shall list all submittals for the project referenced by draft log

number. Provide the estimated date that the submittal will be transmitted to the Architect for review.

- B. Within seven (7) calendar days from the date of the Pre-Construction Meeting, submit a Proposed Products List. This list shall be a complete listing of all products proposed for use, with name of manufacturer, service headquarters, trade name and model number of each product. Partial listings will not be accepted.
- C. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.15 SUBCONTRACTOR LIST

- A. The Contractor shall submit, on AIA Form G705, within FIFTEEN (15) calendar days after the date of the Notice to Proceed, a list of all subcontractors, including the names of the major subcontractors that were submitted at the time of the bid.
- B. Indicate M/WBE subcontractors in accordance with the requirements contained in other portions of the Project Manual.

1.16 MATERIAL SAFETY DATA SHEETS (MSDS)

- A. Comply with "Right to Know" requirements of Chapter 551 of Laws of New York, 1980, concerning notification of the use of toxic substances.
- B. Any product or substance used by the Contractor or its subcontractors which is listed in Subpart Z of OSHA Part 1910 Title 29 of the Code of Federal Regulations entitled "Toxic and Hazardous Substances" shall be identified to the Owner/Architect by the Contractor's submission of a standard Material Safety Data Sheet (MSDS) in accordance with "Right To Know" requirements.
- C. Products will not be permitted to be kept on site without a MSDS.

1.17 SHOP DRAWINGS

- A. Submit shop drawings for all fabricated work, for all manufactured items and for items specifically required by the specifications.
- B. Subcontractors shall submit shop drawings directly to the Contractor for checking. Thoroughly check subcontractors' shop drawings for measurements, sizes of members, details, materials, and conformance with the Contract Documents.
 - 1. Return submittals which are found to be inaccurate or in error.
 - 2. Do not submit to the Architect until all corrections have been made.
- C. Clearly show the relationship of the various parts of the project and where the information provided on the submission depends upon field measurements and existing conditions.
- D. The Contractor shall make all measurements, confirm existing conditions, and include them on the shop drawings before making a submission to the Architect.
- E. Submissions for a single item, or group of related items shall be complete.
- F. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
- G. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

- H. When submitting manufacturers' catalogs, pamphlets or other data sheets, in lieu of prepared shop drawings, clearly mark the items being submitted for review.
- I. If the shop drawings contain any departures from the contract requirements, specifically describe them in the letter of transmittal.
 - 1. Where such departures require revisions to layouts, structural, architectural, electrical, HVAC or any other changes to the work as shown, Contractor shall, at his own expense, prepare and submit revised drawings accordingly.
 - 2. Make drawings the same size as the Contract Drawings and to the same scale.
- J. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
- K. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:
 - 1. Dimensions.
 - 2. Identification of products and materials included by sheet and detail number.
 - 3. Compliance with specified standards.
 - 4. Notation of coordination requirements.
 - 5. Notation of dimensions established by field measurement.
 - 6. Sheet Size: Except for templates, patterns and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 inches by 11 inches but no larger than 36 inches by 48 inches.
 - 7. All Technical Submittals.

1.18 SAMPLES

- A. Where required, or where requested by the Architect, submit sample or test specimens of materials to be used or offered for use.
 - 1. Samples shall be representative, in all respects, of the material offered or intended, shall be supplied in such quantities and sizes as may be required for proper examination and tests, and shall be delivered to Architect, prepaid, along with identification as to their sources and types of grades.
 - 2. Submit samples well in advance of anticipated use to permit the making of tests or examinations.
- B. Samples will be checked for conformance with the design and for compliance with the Contract Documents.
- C. Work shall be in accordance with the approved sample. The use of materials or equipment for which samples are requested or required to be submitted is not permitted until such time that the Architect has completed his review.

1.19 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation. Provide manufacturer's instructions with shop drawings.

1.20 CERTIFICATIONS

- A. Submit certifications of compliance indicated in the Contract Documents.
- B. Certifications shall be complete and exact, they shall be properly authenticated by the written signature, in ink, of an owner, officer or duly authorized representative of the person, firm or organization issuing such certification and they shall guarantee that the materials or equipment are in complete conformance with the requirements of these specifications.

1.21 COLORS AND PATTERNS

- A. Unless the precise color and pattern are specified, whenever a choice of color or pattern is available in a specified product, submit accurate color and pattern charts for Architect's and Owner's review and selection.

1.22 MANUFACTURER'S SERVICE CENTER

- A. The product of a manufacturer who does not maintain an adequate nearby service center and a sufficient stock of spare parts are subject to rejection by Architect solely on that basis.
- B. With each submission, submit information on manufacturer's facilities and give complete details of his service policies and capabilities, and a general idea of the stock of spare parts available. Submit this information in the form of a certification. Also include names, addresses and telephone numbers of at least three of the service center's present customers who are in the area of the project.

1.23 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Distribution: It is the contractor's responsibility to coordinate submittals with each subcontracting trade. Each contractor shall be required to provide their subcontractors with a complete list of their submittals in order that other contractors can request required submittal information.
 - 1. When revisions are made, distribute 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 construction activities.

1.24 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report recording the following information concerning events at the site, and submit one copy to the Architect and one copy to the Owner's Construction Representative by 10:00 a.m. the following day. Any contractor not submitting required reports will not receive approval in the subsequent application for payment until such time that all required information is submitted
 - 1. List of subcontractors at the site.
 - 2. Count of personnel at the site (substantiates payroll).
 - 3. High and low temperatures, general weather conditions.
 - 4. Accidents and unusual events.
 - 5. Meetings and significant decisions.
 - 6. Stoppages, delays, shortages, and losses.
 - 7. Meter readings and similar recordings.
 - 8. Emergency procedures.
 - 9. Orders and requests of governing authorities.
 - 10. Change Orders received, implemented.
 - 11. Services connected, disconnected.
 - 12. Equipment or system tests and startups.
 - 13. Partial Completions, occupancies.

14. Substantial Completions authorized.

1.25 TEST RESULTS AND INSTALLATION

- A. Whenever field startup services are specified, the Contractor shall obtain from the manufacturer and submit to the Architect Manufacturer Startup Reports (MSR's). The report shall detail the results of the field visit and all special conditions resulting from the startup.
- B. Whenever field or factory tests are required on materials, equipment and systems, such tests shall be performed and the test results submitted to Architect in the form of a MSR.
- C. Do not deliver to the project or incorporate into the work any materials or equipment for which Architect has not completed his review and found same to be in general conformance with the Contract Documents.
- D. Submit MSR's within thirty (30) calendar days after the date of the startup or factory test.

1.26 SPARE PARTS LIST

- A. Prepare a list of all spare parts specified to be provided in other Sections. Compile the total list for the purposes of reviewing actual spare parts delivered versus spare parts specified to be provided. The list shall reference the Section, model number, and quantity to be provided.

1.27 WAIVER OF CERTAIN SUBMITTAL REQUIREMENTS

- A. Unless otherwise specified, the requirement to submit data and samples for products specified for approval will be waived for products specified by brand name if the specifically named products are furnished for the work. In such cases, the Contractor shall submit two (2) copies of required Product Data directly to the Architect's field representative for information and verification during its incorporation into the work. The SUBMISSION TRANSMITTAL FORM shall always be used.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

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CONTRACTOR'S COMPANY NAME
ADDRESS

SUBMISSION TRANSMITTAL FORM

CLIENT NAME: WHITE PLAINS CITY SCHOOL DISTRICT

PROJECT TITLE: RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL

H2M PROJECT NO.: WPSD2401

Product, Item, or System Submitted:			
Submission Date:		Submission Log No.:	
Specification Section:		Paragraph Reference:	
Contract Drawing Reference(s):			
Manufacturer's Name:			
Manufacturer's Mailing Address:			
Manufacturer's Contact Information:	<i>Name</i>	() <i>Tel. no.</i>	<i>Email</i>
Supplier's Name:			
Supplier's Mailing Address:			
Supplier's Contact Information:	<i>Name</i>	() <i>Tel. no.</i>	<i>Email</i>
This item is a substitution for the specified item:	____ No		____ Yes
Contractor's Approval Stamp with Signature & Date	<u>Contractor's Brief Comments or Remarks</u> (attach separate letter as needed):		
	By making this submission, we represent that we have determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving the item into the enclosed space, materials, catalog and model numbers and similar data and that we have checked and coordinated this submission with other work at or adjacent to the installed location in accordance with the requirements contained in the Contract Documents.		

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Codes
- B. Governing agencies
- C. Permits

1.02 CODES

- A. Comply with the requirements of the various codes referred to in these Specifications. Such codes shall be the date of the latest revision in effect at the time of receiving bids.
- B. If there is a conflict between local, state, and/or Federal regulatory requirements, seek a consultation with the State Department of Labor. Resolve conflicts to the satisfaction of the State Department of Labor prior to commencing work.
- C. Electrical Work: Conform to the requirements of the National Electrical Code (NEC) unless otherwise shown or specified. The Owner will be the sole judge of the interpretation of these rules and requirements.
- D. Elevator Work; conform to:
 - 1. American National Standard Safety Code for Elevators, Dumbwaiters, and Escalators as approved by American Standards Association, referred to herein as ANSI Code.
 - 2. Industrial Code Bulletin No. 8 as adopted by the State Industrial Board, State of New York, Department of Labor, Board of Standards and Appeals. Submission of plans and specifications, and request for elevator tests to the Department of Labor and the issuance of a certificate of approval from the Department of Labor will not be required.
 - 3. In event of conflict between American National Safety Code and New York State Code Bulletin 8, the more rigid requirements shall apply as interpreted by the State.

1.03 GOVERNING AGENCIES

- A. All work shall conform to and be performed in strict accordance with all governing agencies such as, but not limited to:
 - 1. Occupational Safety and Health Act - OSHA
 - 2. State Department of Environmental Conservation
 - 3. State Building Code
 - 4. State Fire Code
 - 5. National Fire Protection Association - NFPA
 - 6. National Electrical Code
 - 7. State Plumbing Code
 - 8. New York State Energy Conservation Construction Code
 - 9. County Department of Health
 - 10. Town Codes, Rules, Laws and Ordinances
 - 11. Sewer District Sewer Use Code
 - 12. Local Water District
 - 13. Electric Utility
 - 14. Gas Utility
 - 15. State Education Department

1.04 PERMITS AND INSPECTIONS

- A. Representatives of the Owner shall have access to the work for inspection purposes. The Contractor shall provide facilities suitable to the Owner to facilitate inspections of the installed work.
- B. Obtain and pay for all permits, fees, licenses, certificates, inspections and other use charges required in connection with the work.
- C. Obtain a New York Board of Fire Underwriters inspection and certificate.
- D. The following permits and/or certifications will be obtained by the Owner from the appropriate permitting agencies:

1.05 NOISE CONTROL

- A. Control noise in accordance with Town and OSHA requirements.
- B. Operations which may generate objectionable noise shall be limited to between the hours of 8:00 a.m. to 4:30 p.m. on weekdays.

1.06 LISTINGS

- A. Equipment and materials for which Underwriters' Laboratories, Inc. (UL) provides product listing service, shall be listed and bear the listing mark. Alternately, ETL Testing Laboratories, Inc. Product Safety Testing Listing is acceptable if the listed product has been tested to the applicable UL Standard.

1.07 FIRE RESISTANT CONSTRUCTION MATERIALS AND ASSEMBLIES

- A. Conform to the fire rating classifications based upon the test methods and acceptance criteria in the Standard, Fire Tests of Building Construction and Materials for which Underwriters' Laboratories, Inc. (UL) provides listings.
- B. Materials and assemblies shall comply with the acceptance criteria, detailed description of the assembly, its performance in the fire test and other pertinent details such as specification of materials, Classification coverage, and alternate assembly details.
- C. Alternatively, fire resistance rating classifications by other issuing organizations listed in the Fire and Building Codes are acceptable.

1.08 COORDINATION WITH ELECTRIC UTILITY COMPANY

- A. Comply with the utility company requirements for the incoming electric service.
 - 1. Pay the utility company's charges in connection with the installation of the incoming service.

1.09 COORDINATION WITH GAS UTILITY COMPANY

- A. Comply with the gas utility company requirements including inspection for the incoming gas service.
 - 1. Pay the utility company's charges in connection with the installation and inspection of the incoming service.

1.10 UTILITY WORK WITHIN STATE HIGHWAY RIGHT-OF-WAY

- A. Utility Work, either overhead or underground, within the boundaries of the state highway right-of-way, shall conform with procedures set forth in the Department of Transportation publications "Department Rules and Regulations Governing the Accommodation of Utilities Within State Highway Right-of-Way (Part 131 - Title 17 Transportation) and "Issuance of Highway Work Permits" (Code 7.12-2).

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 ABBREVIATED SUMMARY

- A. This Section explains the format of the specifications.

1.02 SPECIFICATION FORMAT

- A. The Specifications are generally arranged according to the Construction Specifications Institute (CSI) format. Most of the technical requirements are specified in the technical specifications of the document, which are grouped into forty-eight (48) major divisions. Most of the legal and administrative requirements are included in Division 01, General Conditions, Information For Bidders, and the Contract (agreement).
- B. Technical sections are arranged in numerical order, however section numbers may not be consecutive from section to section.
- C. Page numbering is subordinate to each section.
- D. Most sections are generally broken down into three (3) parts:
 - 1. PART 1 - GENERAL
 - 2. PART 2 - PRODUCTS
 - 3. PART 3 - EXECUTION
- E. Not all these parts may be used and in some cases, the title of some of the parts may be different than listed above. Paragraph numbers are subordinate to each part.
- F. The Contractor is advised that the format described here is flexible in nature.
 - 1. There is some overlapping of specified information between various portions of the Specifications.
 - 2. In all cases, the entire requirements of the Contract Documents for the project shall apply.
- G. Explanations:
 - 1. Many technical sections begin with a paragraph titled "SECTION INCLUDES", "DESCRIPTION", or similar wording.
 - a. In these paragraphs, a brief listing of the specified products may appear or a brief description of the work generally specified in that section is presented.
 - b. These descriptions or listings are not all inclusive, but merely are provided as an aid in locating subject matter.
 - c. In some cases special cost related items of work are called to the attention of the Contractor in these opening paragraphs.
 - 2. "RELATED SECTIONS" or "RELATED WORK" or similar wording paragraphs list or reference related work specified elsewhere in the Contract Documents. Such listing is not all inclusive, rather, they are merely an aid to the Contractor in locating some of the other Specification Sections wherein work is specified which has a particularly close interrelationship with the work specified in that section.

- a. It shall be understood that all of the Work, and all of the Specifications and other portions of the Contract Documents, are interrelated, and that the total of all requirements set forth in all of the Contract Documents shall be met.
 - b. Equipment suppliers and manufacturers shall be advised of the requirements for making submittals and delivering products, as specified in Division 1 sections, even if said sections are not referenced therein that section.
3. "REGULATORY REQUIREMENTS" or "REFERENCES" or similar wording paragraphs describe standards, laws, guidelines, regulations, and standards related to workmanship and installation of the products specified which shall be followed by the Contractor in completing the work specified therein that section as if it was written there in that section. All such requirements and references shall be latest issue in effect at the time of the bid opening.
4. When a "GUARANTEE" or "WARRANTY" paragraph appears in the section it is calling attention to a guarantee which extends beyond the period of the Contractor's Guarantee called for in the administrative portion of the Contract Documents or it states special requirements specific to the equipment, systems or products specified in that section.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes the requirements for pre-installation meetings.

1.02 PRE-INSTALLATION MEETINGS

- A. As required in individual specification sections, the Contractor shall convene a pre-installation meeting at the site prior to commencing work of the section.
- B. Pre-installation meetings are to be convened at least one week prior to commencing work on the section. The contractor shall arrange and require attendance of Owner's Construction Representative, Owner, and Architect and parties directly affecting, or affected by, work of the specific section.
 - 1. At least seven (7) calendar days advance notice is to be given.
 - 2. The contractor shall prepare agenda and preside at meeting. At a minimum the following items are to be discussed:
 - 3. Review conditions of installation, preparation and installation procedures.
 - 4. Review coordination with related work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements for monitoring the quality of the constructed project.
- B. Work of this Section also includes services of an independent testing laboratory for quality assurance testing.

1.02 REFERENCES

- A. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- B. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- C. ASTM D4561 - Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials.
- D. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.03 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or workmanship that is more precise.
- C. Perform work by persons qualified to produce workmanship of specified quality.
- D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- E. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.04 MOCK-UP

- A. Tests will be performed under provisions identified in this Section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashing, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining work.
- D. Where a mock-up has been accepted by the Architect and is specified to be removed, then the Contractor shall remove the mock-up and the clear area when directed to do so by the Architect.

1.05 QUALITY ASSURANCE - TESTING LABORATORY

- A. In order to establish compliance with the Contract Documents, materials shall be tested, examined and evaluated before they are incorporated into the work. During and after installations, additional tests, examinations, and evaluations shall be made to determine continued compliance throughout the course of the work.
- B. Testing laboratory shall be a reputable, experienced firm that is capable of performing all of the required testing and authorized to operate in the state in which the project is located.
- C. Perform all sampling and testing in accordance with specified procedures and use the materials, instruments, apparatus, and equipment required by the codes, regulations and standards. Where specific testing requirements or procedures are not described, perform the testing in accordance with all pertinent codes and regulations and with recognized standards for testing.
- D. In the event that samples and test specimens are not properly taken, handled, stored or delivered or if other requirements of this Section are not complied with, Architect reserves the right to delegate any or all of this work to others, or to take whatever action deemed necessary to ensure that sampling and testing are properly accomplished, for which all costs shall be borne by Contractor.
- E. Architect reserves the right to disapprove the use of a specific testing laboratory, even after prior approval, if the laboratory fails to meet or comply with the requirements of this Section. If this should occur, immediately discharge the testing laboratory and retain the services of a different laboratory acceptable to Architect.
- F. The testing laboratory shall meet the following criteria:
 - 1. Be capable of performing all of the required tests.
 - 2. Be regularly engaged in performing the types of services required.
 - 3. Have adequate facilities, materials, equipment, and personnel to perform the services.
 - 4. Have an adequately trained, experienced and qualified staff.
 - 5. Have at least one registered professional engineer licensed in the state in which the project is located who shall be capable of performing field tests, supervising laboratory testing and interpreting test results. The professional engineer shall be thoroughly knowledgeable in materials, soils, asphalt paving and concrete.
 - 6. Shall be able to be on the Project site within two hours after being notified.
 - 7. Comply with the requirements of ASTM C1077, ASTM D3740, ASTM D4561, ASTM E548 and ASTM E699.
 - 8. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.06 REFERENCE STANDARDS

- A. Conform to reference standards by date that the project was last bid.
- B. Obtain copies of standards when required by Contract Documents.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.07 SCHEDULING - LABORATORY SERVICES

- A. Except where otherwise specified, the Architect will determine the number of samples to be taken, the date and time samples will be taken and tests made, the number and type of tests to be performed, who will collect the samples, how they will be handled and stored and when laboratory personnel are required on site.
- B. Architect will notify Contractor of his/her decision to take samples and/or have tests made and provide him with the pertinent information. Contractor is responsible for notifying the testing laboratory and for having the testing performed, on schedule.
- C. In addition to the above, Contractor shall make his/her own arrangements for the sampling and testing of materials he/she proposes to incorporate into the work. This shall not be paid for out of the cash allowance.
- D. Notify Architect at least 72 hours in advance of the times at which scheduled samples or tests will be conducted.
- E. If samples and/or tests cannot be taken or performed when required, delay the work until such time that they can be accomplished. Where possible, any work that has been installed but has not been sampled or tested as required, shall be tested by other means. Upon Architect's request, uncover any work, which has been buried or covered, and perform special tests designated by Architect. If the work cannot be tested by other means, Architect may declare the work unacceptable. All costs associated with noncompliance and for special testing shall be borne by the Contractor and not be paid for out of the cash allowance.
- F. Should the testing laboratory be scheduled to take or collect samples or to perform tests, and finds that it is unable to do so as a result of delays in construction, inclement weather, or any other reason, reschedule the tasks for a date acceptable to Architect. Costs associated with times testing laboratory is unable to perform scheduled services shall be borne by the Contractor and will not be paid for under the allowance.
- G. Plan all work and operations to allow for the taking and collection of samples and allow adequate time for the performance of tests. Delay the progress of questionable work until the receipt of the certified test reports.

1.08 FIELD OBSERVATION OF CONTRACTOR'S WORK

- A. The Architect will provide periodic observation of the Contractor's work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions. Verify that the existing substrate is capable of structural support or attachment of new Work being applied or attached. Examine and verify specific conditions described in individual specification sections. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance. Seal cracks or openings of substrate prior to applying next material or substance.
- B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 FIELD QUALITY CONTROL

- A. Allow representatives of the testing laboratory access to the work at all time. Provide all equipment, labor, materials, and facilities required by the laboratory to properly perform its functions. Cooperate with and assist laboratory personnel during the performance of their work.
- B. Test specimens and samples shall be taken by the person(s) designated in other Sections, or as directed by Architect. Conduct field sampling and testing in the presence of Architect. Provide all materials, equipment, facilities and labor for securing samples and test specimens and for performing all field-testing.

END OF SECTION

SECTION 014500.01
STATEMENT OF SPECIAL INSPECTIONS AND TESTS

NYS EDUCATION DEPARTMENT Office of Facilities Planning 89 Washington Avenue, Room 1060 EBA Albany, NY 12234	STATEMENT OF SPECIAL INSPECTIONS AND TESTS As required by the Building Code of NYS (2020 BCNYS) <i>Note: The code listings below are not to be considered all inclusive.</i>	
BCNYS § 1704.2.3 requires the NYS Licensed Design Professional (of record) to complete the Statement of Special Inspections and Tests. Completion of the Statement of Special Inspections & Tests, and Submission to the Office of Facilities Planning with the Construction Permit Application is a condition for issuance of the Building Permit.		
School District WHITE PLAINS CITY SCHOOL DISTRICT	Project Title: RENOVATIONS AT ROCHAMBEAU ALTERNATIVE HIGH SCHOOL	
Building ROCHAMBEAU ALTERNATIVE HIGH SCHOOL		
SED Project # 60-22-00-01-0-015-020	Project Address 228 FISHER AVENUE, New York, 10606	
Architect/Engineer:		
Sign and Stamp:		
A/E Firm (or DbA) : H2M architects + engineers	Phone	Date
Comments:		

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
A. Steel Construction						

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
1. Material verification of high-strength bolts, nuts and washers.		X	Applicable ASTM material specifications. AISC 360	1705.2 2204	X	051200
2. Inspection of high-strength bolting.	X	X	AISC 360 ACI 318	1705.2 2204.2	X	051200
3. Material verification of Structural steel. Open Web Steel Joist and Girders , Basic protection of steel members, Seismic Resistance			AISC 360 ASTM A6, A514, A29 SJ100, 200 AISC 341	1705.2 2203, 2205 1705.2 2207	X	051200 052100
4. Spray Applied Fire Resistant Materials & Specialized Finishes			ASTM E650, E736	1705.14 1705.15		
5. Cold Formed Steel Construction - load bearing Seismic Resistance			AISI S100, S220, S420 ANSI/SDI-NC1.0, RD1.0, SDI-C, ASCE 7, 8 AISI S400	1704.2.5 2210 2211		
6. Material verification of weld filler materials			AWS D1.1, D1.3	1705.2 2204.1		051200
7. Inspection of welding:			ACI 318: 26.6.4	T 1705.3 2204	X	051200
a. Structural steel	X	X	AWS D1.1, D1.3	1705.2	X	051200
b. Reinforcing steel	X	X	AWS D1.1, D1.3	1705.3.1	X	051200
c. Cold Formed Steel Deck			AISC S100, ASCE7, 8		X	053100
8. Inspection of steel frame joint details.		X		1705.2		051200
B. Concrete Construction Ch. 19						
1. Inspection of reinforcing steel, including prestressing tendons, and verify placement		X	Ch. 21, 22 ACI 318; Ch. 20, 25.2, 25.3, 26.6.1, 26.6.3 AISC 360	T 1705.3 1901 1905	X	033000
2. Inspection of reinforcing steel bar welding			\ACI 318, AWS D1.4	T1705.3		
3. Inspection of anchors to be installed in concrete prior to and during placement	X		ACI 318,17.8.2, 17.8.2.4	T 1705.3		
4. Verify use of required design mix		X	ACI 318; Ch. 19, 26.4.3, 26.4.4	T1705.3 1904 1908	X	033000

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
5. Sampling fresh concrete, slump, air content, temperature, strength test specimens.	X		ASTM C172, Ch31 ACI 318: 26.5, 26.9 26.10, 26.11 ASTM C143 ASTMC231 ASTM C1064 ASTM C39	T1705.3 1901 1905 1908	X	033000 0321313:3.10
6. Inspection of placement for proper application techniques.	X		ACI 318: 26.5	T1705.3	X	033000
7. Inspection for maintenance of specified curing temperature and techniques		X	ACI 318: 26.5	T 1705.3 1908 1909		
8. Inspection of prestressed concrete.	X		ACI 318: 26.10	T 1705.3		
9. Erection of precast						
10. Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	ACI 318: 26.11.2	T1705.3		
11. Inspection of formwork.		X	ACI 318: 26.11.1.2 (b)	T 1705.3		

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
C. Masonry Construction Ch. 21						

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD		B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
L1 = Level 1 Inspection required for nonessential facilities. L2 = Level 2 Inspection required for essential facilities. * In general, schools are not considered essential facilities unless they are a designated emergency shelter.			ASTM E119 UL 263 ASTM C1364 ASTM C1670 ASTM A706 ASCE 7, 8	TMS 402, 403, 404, 504, 602	1705.4 2101 1604		
1. Verify to ensure compliance							
a. Proportions of site prepared mortar and grout.		X L1 L2			1705.4 2103.2		042200
b. Placement of masonry units and construction of mortar joints.		X L1 L2			1705.4 T 1705.3	X	042000
c. Location and placement of reinforcement, connectors, tendons, anchorages.		X L1 L2			1705.45 2103.4 T 1705.3	X	042000
d. Prestressing technique. Grout space prior to grouting	X L2	X L1			1705.4 1705.4		
e. Grade and size of prestressing tendons and anchorages Placement of grout	X L2	X L1			1705.4 1705.4		
f. Grout specs prior to grouting							
2. Inspection program shall verify:							
a. Size and location of structural elements		X L1 L2			1704.5 1705.4	X	042000
b. Type, size, and location of anchors	X L2	X L1			1705.4 T 1705.3	X	042000
c. Specifies size, grade, and type of reinforcement.		X L1 L2			1704.5	X	042000

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
d. Welding of reinforcing bars	X L1 L2			1704.5	X	042000
e. Cold/hot Weather protection of masonry construction		X L1 L2		1704.5 2104.3 2104.4	X	042000
f. Prestressing force measurement and application	X L2	X L1		1704.5		
3. Verification accessory placement prior to grouting	X L2	XL 1		1704.5, 2105.2.2 2105.3		
4 Grout placement	X L1			1704.5	X	
5. Preparation of grout specimens, mortar specimens and/or prisms.	X L1 L2			1704.5, 2105.2.2 2105.3	X	042000
6. Compliance with documents and submittals		X L1 L2		1704.5	X	042000

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
D. Wood Construction Ch. 23						
1. Fabrication process of prefabricated Wood Structural Elements and assemblies.		X	Ch. 16 AWC, APA, CPA DOC PS1, PS2	1704.6 1705.5 2302, 2303 2304		033000

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
2. High-load diaphragms Seismic Resistance		X		1704 1705 1704.6 2304 2305 2306, 2307, 2308		
E Soils			Ch. 18			
1. Geotechnical Investigations, Excavations, Grading, Fill Damp-proofing Water-Proofing		X	ASTM E329, ASTM D3740, ASTM E548, NYS DOT OSHA Appendix J - BCNYS	1704, 1706 1803, 1804, 1805	X	312000
2. Flood & Stormwater Hazards (per BCNYS 106)		X	<u>Local Highway Authority</u> <u>Flood Plain Admin.</u> Appendix G - BCNYS	1705.12 - 1705.12.9		
F. Specialized Foundations, Piers, Piles			Ch. 16			
1. Deep Foundations Driven Piles Cast-in Place Helical Piles		X		T 1705.7 T1705.8 1705.7 1705.8 1705.9		
G. Exterior Wall Coverings			Ch. 14			
1. Exterior Insulation and Finish Systems (EIFS) MCM, HPL, Other Combustible Materials		X	ASTM E2568, E2273, E2570, E2393, E84 Ch. 16 NFPA 268, 275, 285,286	1405, 1406, 1407, 1408 1704.2 1705.12.5 1705.16		
H. Miscellaneous						
1. Access Floors and Storage Racks Other Architectural, MEP Components Seismic Resistance		X		1705.12		
2. In-Situ Testing		X		1604.6 1708		

INSPECTION AND TESTING Continuous & Periodic is as Defined by the BCNYS - CHAPTER 17 All reports to be submitted to the Owners Representative for use, approval , and record.	C O N T I N U O U S	P E R I O D I C	REFERENCE STANDARD	B R C E N F Y E S R E N C E	C R H E Q C U K I R I E F D	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
3. Pre-construction Load Testing		X		1604.7 1709		
4. Fire Resistant Penetrations & Joints Fire Stops Testing for Smoke Control		X	Ch. 7 ASTM E119 UI263	1705.17 1705.18		
5. <u>Pre-Submission:</u> Inventory of all Fire-Resistant-Rated Construction - Level 2 Alterations and greater (per BCNYS 106)	X		verification required EBNYS Ch.3 C. of E. 155 Regulations	<u>FCNYS</u> <u>701.6</u> <u>BCNYS</u> <u>703.7</u> 19CRRNY XXXII		
6. <u>Pre-Submission:</u> Hazardous Material Survey Water Quality Survey	X X		verification required <u>ACM Letter -</u> <u>Certificate</u> C.of E. 155 Regulations	US-EPA NYS-DOH		
7. Other:						

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Asbestos and lead-based paint certification.
- B. Moisture control.

1.02 ASBESTOS AND LEAD-BASED PAINT CERTIFICATION

- A. Contractor shall submit the enclosed "Asbestos and Lead-Based Paint Certification" upon completion of all work.

1.03 MOISTURE CONTROL

- A. The Contractor shall maintain a strict policy and protocol for the control of water infiltration and moisture build-up during the course of the project. The plans and specifications are not intended to depict each and every condition or detail of construction. As the knowledgeable party in the field, the Contractor is in the best position to verify that all construction is completed in a manner which will provide a watertight structure. The Contractor has the sole responsibility for ensuring the watertight integrity of the structure. The Contractor's contractual obligations include, but are not limited, to the following:
- B. Water Infiltration: If the Contractor observes water infiltration (unintended) into a completed building or an ongoing construction site, he/she must immediately report the condition to the Owner and Architect, and shall immediately take steps to investigate the source of the water infiltration, identify the responsible party (person who performed work that resulted in water infiltration) and devise a procedure to promptly eliminate water infiltration into the building.
- C. Handling of Water-Damaged Building Materials and Construction:
 - 1. Contractor shall inspect all building materials delivered to the site for pre-existing water damage, as well as existing mold growth.
 - 2. If in-place construction becomes wet, notify the Owner and Architect immediately. The Owner and Architect will determine whether or not the work shall be removed and replaced, or if the type of material can be permitted to dry.
 - 3. Under no circumstances may new or additional construction be placed over, or otherwise enclose, wet building materials.
- D. Visible Mold/Mildew:
 - 1. If the Contractor observes any substance that appears to be mold or other fungal growth and/or an unidentified substance within a completed building or the ongoing construction site, he/she shall immediately suspend construction operations in the area, and report the condition to the Owner and Architect.
 - 2. No person shall be allowed back into the affected area without permission of the Owner.

1.04 SUBMITTALS

- A. Contractor shall submit completed and notarized "Certification of Asbestos and Lead-Based Paint" form.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

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**Certificate of Asbestos and Lead-Based Paint
(New Work)**

Client's Name: _____

Project Location: _____

Project Address: _____

Project Name: _____

Project Number: _____

CERTIFICATION:

This Contractor hereby certifies that no asbestos-containing material and lead-based paint, as defined by applicable federal and state regulations, has been furnished or installed at the referenced project:

Contractor Name: _____

Signature: _____

Address: _____

Telephone: _____ Date Executed: _____

This Form Shall Be Notarized

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Drainage.
 - 2. Water Service and distribution.
 - 3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
 - 4. Ventilation.
 - 5. Electric power service.
 - 6. Lighting.
 - 7. Temporary Heating.
- C. Support facilities include, but are not limited to, the following:
 - 1. Waste disposal facilities.
 - 2. Field offices.
 - 3. Storage and fabrication sheds.
 - 4. Lifts and hoists.
 - 5. Staging areas.
 - 6. Construction aids and miscellaneous services and facilities.
 - 7. Scaffolding and platforms
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Stormwater control.
 - 3. Tree and plant protection.
 - 4. Pest Control.
 - 5. Site enclosure fence.
 - 6. Security enclosure and lockup.
 - 7. Barricades, warning signs, and lights.
 - 8. Covered walkways
 - 9. Temporary enclosures.
 - 10. Temporary partitions.
 - 11. Fire protection.
- E. Unless work of this section is indicated to be provided under a specific contract, Contractor must provide, maintain and remove required temporary facilities necessary to perform his own construction activities.
- F. Accessible Temporary Egress: Comply with applicable provisions in ICC A117.1.

1.02 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, fire department, and rescue squad rules.
 - 5. Environmental protection regulations.

- B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
 - 1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.03 PROJECT CONDITIONS

- A. Temporary Utilities: Each contractor will prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-preventive measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

1.04 DIVISION OF RESPONSIBILITIES

- A. General: These Specifications assign the Contractor responsibilities.
- B. Each Contractor is responsible for the following:
 - 1. Installation, operation, maintenance and removal of each temporary facility considered as its own normal construction activity, as well as the costs and use charges except as listed below.
 - 2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
 - 3. Its own storage and fabrication sheds.
 - 4. Hoisting requirements, including hoisting loads in excess of 2 tons, hoisting material or equipment into spaces below grade, and hoisting requirements outside the building enclosure. (Rigging Insurance must be provided by each prime contractor)
 - 5. Collection and disposal of its own hazardous, dangerous, unsanitary, or other harmful waste material.
 - 6. Secure lock-up of its own tools, materials and equipment.
 - 7. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
 - 8. Maintaining temporary facilities provided by Contractor.
 - 9. Complying with the regulations of the Commissioner of Education - 8 NYCRR 155.5 - Uniform Safety Standards for School Construction and Maintenance Projects specified in Division 1 Section 011400.
 - 10. Containers for non-hazardous waste and debris generated by their own demolition and construction operations.

1.05 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner, Architect or Owner's Construction Representative and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. The Owner's Construction Representative.

2. Other Contractors.
 3. Owners construction forces.
 4. Occupants of Project.
 5. Architect .
 6. Testing Agencies.
 7. Personnel of authorities having jurisdiction.
- B. Water Service: Use water from the Owner's existing water system without metering and without payment of use charges. Access to water shall be approved by the Owner.
- C. Electric Power Service: Temporary electric power including set-up and maintenance is the responsibility of the Electrical Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. If acceptable to the Architect / Construction Manager, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Lumber and Plywood:
1. For job-built temporary offices, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
 2. For signs and directory boards: provide exterior grade APA HDO plywood of sizes and thicknesses indicated.
 3. For vision barriers, provide minimum 3/8-inch-thick exterior plywood.
 4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch-thick exterior plywood over appropriate wood framing.
- C. Paint:
1. Paint surfaces exposed to view from Owner occupied areas in a color selected by the Owner's Construction Representative. Maintain coverage throughout the construction period.
- D. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- E. Water: Provide potable water approved by local health authorities. Protect water sources with approved backflow or vacuum breaker devices.
- F. Open-Mesh Chain Link Fencing: Provide 0.120-inch-thick, galvanized steel posts, and 2.875" diameter. Gate posts with 6 foot high mesh on stanchion posts spaced 8-foot on center maximum. Provide lockable gates with galvanized chains and security padlocks. Furnish keys to the Owner, Owner's Construction Representative, Prime Contractor representatives, and necessary construction personnel.
- G. Temporary Roofing: 5/8" FR plywood roof sheathing and 45 mil reinforced EPDM membrane
- H. Temporary Flooring protection : " Ram Board" or equivalent with taped joints.

2.02 EQUIPMENT

- A. General: Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4-inch, heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge and vacuum breakers at hose bib connections .
- C. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the potential exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.01 CONTRACTOR FIELD OFFICES

- A. Contractors may, with permission from the Owner and Owner's Construction Representative, establish a field office for their own use. Offices for the individual prime contractors, sub-contractors, specialty contractors and the like shall be of size and design as approved by the Owner and Owner's Construction Manager. Offices shall be located in the designated staging area. Each representative contractor shall arrange for telephone service and electric service, if required, directly with the utility company. (No field offices or storage trailers will be allowed within 100 feet of any building.)
- B. Maintain, in the each contractor's field office, all articles for First Aid treatment. Each contractor shall also establish standing arrangements for the immediate removal and hospital treatment of any employees and other persons on the job site who may be injured or who may become ill during the course work.

3.02 TEMPORARY AND PERMANENT SERVICES, GENERAL

- A. The Contractor's use of any permanent system or service of the building or portions thereof shall be subject to the Owners approval.
- B. The Contractor shall be responsible for any and all damage to permanent services used, and shall make good any and all damage to the satisfaction of the owner, prior to final completion and acceptance.
- C. NOTE - In accordance with OSHA and other applicable regulations, the representative Contractors performing erection of "skeleton" type work are solely responsible for the netting, guard rail protection and such other safety devices as deemed necessary to protect the workers and public from harm.

3.03 TEMPORARY LIGHT AND POWER

- A. Temporary Electric Power Service: Electrical Contractor shall provide and pay all costs to provide a weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period.

1. Responsibility: All work under this section to be provided by the Electrical Contractor.
2. Applicability: This section applies to all renovation and new construction work areas for this Project.
3. Electrical Contractor shall make arrangements with utility company for temporary and permanent services immediately after award of contract.
4. Temporary or permanent services for temporarily or permanently installed building equipment such as sump pumps, boilers, cabinet heating and/ or cooling units and fans shall be furnished, installed, operated and maintained so that the said equipment may be operated for drainage and temporary heat when required and/ or when so ordered by the Architect and Owner's Construction Representative.
5. Electrical Contractor shall maintain all parts of the electrical system (temporary and permanent) active and in-service at all times throughout the contract duration. All temporary lighting to be controlled by standard switches per code (outside of power panels).
6. Electrical contractor shall provide temporary generator power to maintain power to critical circuits during main electric service switch over. Critical circuits shall include fire alarm, emergency lighting, communication, information technology, heating units, etc. Coordinate required circuits with owner. Contractor shall assume a minimum of (2) 50 kw generators and temporary panels as necessary. Generators shall be located at the building exterior. Provide feeder cables, adequately sized, in accordance with NEC to feed temporary panels or existing sub-panels. Contractor shall include required fuel for operation.
7. Electrical Contractor shall maintain power during the hours established by Owner's Construction Representative.
8. Temporary Service: Install service and grounding in compliance with the National Electric Code (NFPA 70). Include necessary meters, transformers, overload protected disconnect and main distribution switch gear. Comply with all NECA, NEMA and UL Standards
9. Provide temporary service with an automatic ground-fault interrupter feature, activated from the circuits of the system.
10. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead. Rise vertically where wiring will be least exposed to damage from construction operations.
11. Provide metal conduit, tubing or armored cable for protection of temporary power wiring where exposed to possible damage during construction operations. Where permitted by code, wiring of circuits not exceeding 110-120 Volt 20 Amp rating and wiring of lighting circuits may be non-metallic sheathed cable in areas where located overhead and exposed. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide metal enclosures or boxes for wiring devices.
12. Provide overload-protected disconnect switch as required by code.
13. For power hand tools and task lighting, provide temporary 4-gang outlets at each floor level, spaced so that a 50-foot extension cord can reach each work area. Provide separate 110-120 Volt, 20 Amp circuit for each 4-gang outlet (4 outlets per circuit).
14. Temporary electric power for Owner's Representative's field office.
15. Temporary power and lighting for any sidewalk bridges.
16. Maintaining all existing systems, including but not limited to, power, lighting, fire alarm, intercom, kitchen freezers and refrigerators, etc., within the existing building operational at all times for Owner occupancy and construction.

B. TEMPORARY ELECTRICAL AND TELEPHONE SERVICES

1. Temporary Power Source: At each building / renovation area, use the existing electrical power distribution system for temporary power source.
2. Owner's Requirements: Do not disrupt the Owner's needs for continuous power at each building.
3. Electrical Contractor shall provide temporary power and lighting facilities for use of all trades. All temporary light and power shall be in accordance with the required Codes and Safety Standards. The temporary light and power shall be used until permanent light and power is completed or portions of the building(s) are enclosed.

4. Owner's Construction Representative on-site trailer already has power and data/tel wiring
5. All other contractor trailer use / connection charges for power and telephone to be paid by the respective contractor.

C. TEMPORARY POWER DISTRIBUTION

1. General Requirements: Electrical Contractor shall provide feeders and branch circuits of adequate size and proper characteristics as required to supply temporary receptacle and lighting loads. Size service and feeder conductors to restrict voltage drop to maximum 5 percent at 80 percent power factor. Provide properly sized overcurrent protection for each temporary electrical circuit.

D. RECEPTACLE REQUIREMENTS

1. General Requirements: Provide temporary receptacle outlets as required for operation of portable tools and appliances during the construction period.
2. Minimum Requirements: Provide a minimum of one quad 120 volt receptacle per 2500 square feet of building floor area, with maximum spacing of 50 feet on center.
3. Branch Circuits: All temporary receptacle branch circuits to be rated 20 amps with a maximum of (3) duplex receptacles per circuit. Temporary receptacle branch circuits shall be independent of temporary lighting circuits.

E. LIGHTING REQUIREMENTS

1. General Requirements: Electrical Contractor shall provide both interior and exterior lighting at areas where existing lighting has been removed and at new construction areas, as required to provide adequate illumination for safe and proper construction operations and Project Site security.
2. Minimum Requirements: Provide illumination levels adequate for construction operations and safe traffic conditions. As a minimum provide one 200 watt lamp per 400 square feet of building floor area, with maximum spacing of 20 feet. Any rooms in excess of 500 sf will receive one 400 watt metal halide fixture for each 1000 sq. ft. of area.
3. Stairways: Provide one 200 watt lamp per landing at each stairway.
4. Barricades: Provide adequate lighting for personnel safety at barricades, ladders, openings and other similar locations.
5. Supplemental Lighting: If required, supplemental lighting beyond minimum requirements shall be provided via suitable portable lighting units with cord and plugs, and shall be paid for by the Contractor or Sub-Contractor requiring such additional lighting.
6. Branch Circuits: All temporary lighting branch circuits to be loaded to a maximum of 1400 watts per 20 amp circuit. Temporary lighting branch circuits shall be independent of temporary receptacle circuits.
7. Restrictions: Do not use permanent lighting systems for temporary construction lighting purposes.

F. MAXIMUM LOADS

1. General: Lighting and power loads connected to the temporary power distribution system shall be limited to the following maximum individual loads:

	Load Type	Maximum
a.	120 V, 1 Phase	1.5 KVA
b.	208 V, 1 Phase	2.5 KVA
c.	208 V, 3 Phase	5.0 KVA

2. General: The temporary power distribution system shall be sufficiently sized to provide temporary power as required within this section. Meter and Meter connections to be part of electrical contractors base bid.

G. ELECTRICAL WELDERS

1. Separate Power Sources Required: Power for electric welders and for other loads larger than the maximum allowable sizes shall be taken from portable power sources provided, paid for and operated by the Contractor or Sub-Contractor requiring the use of such equipment. Remove such power sources when no longer needed.

H. ELECTRICAL ENERGY COSTS

1. Paid By Owner: Charges for electrical energy usage for temporary power and lighting will be paid by the Owner, when taken from the Owner's electrical services. Contractor and Sub-Contractors shall exercise measures to conserve energy usage. Use of Owner supplied electric for items not specific to project (e.g. heating construction shanties, etc.) will not be permitted.

I. USE CHARGES

1. General: Cost or use charges for temporary facilities are not chargeable to the Owner or the Architect, Engineer, or Owner's Construction Representative. The Architect and Owner will not accept a prime contractor's cost or use charges for temporary services or facilities as a basis of claim for an adjustment in the Contract Sum or the Contract Time.
 - a. Water Service Use Charges: Water from the Owner's existing water system may be used without metering, and without payment for use charges.
 - b. Electric Power Service Use Charges: Electric power from the Owner's existing system may be used without payment of use charge

3.04 TEMPORARY TOILET FACILITIES

- A. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities; provide not less than specified requirements. Install in locations which will best serve the project's needs. Owner's existing facilities shall not be used.
- B. Responsibilities: The General Construction Contractor is responsible for temporary sanitary facilities and their maintenance, cleaning and supplies for use by all trades. Sufficient quantity/locations to properly handle the amount of workers on-site.
- C. Supply and maintain toilet tissue, paper towels, paper cups and other disposable materials as appropriate for each facility, including Owner's Construction Representative temporary offices for full contract duration. Provide covered waste containers for used material.
- D. Install self-contained toilets to the extent permitted by governing regulations.
- E. Provide separate toilet facilities for male and female construction personnel.
- F. Provide separate toilet facilities for Owner's Construction Representative located at _____ at the direction of Owner's Construction Representative.

3.05 TEMPORARY HEATING

- A. The Mechanical Contractor will maintain 60 degree temperature in all areas via temporary and/or permanent systems. The Mechanical Contractor will submit a detailed plan including sketches indicating his proposed temporary heating system for engineer approval within 1 week of contract award. The Electrical Contractor will provide permanent or temporary power for the Mechanical Contractor's units for temporary heating. General Work Contractor will insure all windows / doors and work areas are fully enclosed. (Any missing components at time of temporary heat activation will be enclosed via 5/8 inch thick plywood, 2" rigid polyisocyanurate and 6-mil fire-retardant polyethylene sheeting for a weather-tight insulated enclosure.)

- B. The fuel, equipment, materials, operating personnel and methods used therefore shall be at all times satisfactory to the Architect and Owner's Construction Representative and adequate for the purpose intended. The use of electric heaters is not acceptable. All required fuel is part of this contract.
- C. The Contractor shall maintain the critical installation temperatures provided in the technical provisions of the specifications herein for all work in those areas where same is being performed.
- D. The maintenance of proper heating, ventilation and adequate drying out of the work is the responsibility of the contractor and any work damaged by dampness, insufficient or abnormal heating, shall be replaced to the satisfaction of the Architect by and at the sole expense of the contractor.
- E. Before and during the placing of gypsum and the application of other interior finishes, taping, varnishing, painting, etc. and until final acceptance by the Owner of all work covered by the Contract, the contractor shall, unless otherwise specified in the contract documents, maintain a temperature of 60 degrees F. Coordinate with Division 9 of the Technical Specifications.
- F. Use of the permanent system, if approved by engineer and owner permission granted, shall not shorten, or negate any equipment, or system guarantees required under this contract. (the warranty period starts upon the date of Substantial Completion). Two additional filter changes are to be provided by Mechanical Contractor. A program of use, maintenance and restoration will be submitted with request for use of systems for temporary services.

3.06 TEMPORARY WATER

- A. The Plumbing Contractor shall:
 - 1. Provide and maintain a temporary water system of size and capacity as required below to supply the needs of all Contractors for the work.
 - 2. Provide no less than two 3/4 inch hose bibs conveniently located at each building wing.
 - 3. Provide and pay for all connections and permits.
 - 4. Install such temporary water system so that service shall be available at the commencement of the work. The permanent water risers and lines may be used for temporary water supply. The permanent services shall be turned over to the Owner in perfect condition. Any repairs required due to temporary use shall be made at the sole expense of the plumbing contractor.
 - 5. Protect temporary and permanent lines against any damage.
 - 6. Remove all temporary lines when directed by the Owner's Construction Representative when such lines are no longer required.
 - 7. Water source is only available from building. If contractor decides distance is too far he should use water storage tanks or truck at no additional charge to the owner.
- B. Each Contractor shall:
 - 1. Provide all hose and other extensions from connections installed by the Plumbing Contractor and all labor, materials and supplies required to supply water to the work.
 - 2. Prevent water damage to the work.

3.07 STORAGE FACILITIES

- A. Each Contractor shall provide temporary storage shanties, tool houses and other facilities as required for their own use. Temporary structures shall be located at the staging area and shall be removed upon completion of the work or when directed.

- B. Materials delivered to the site shall be safely stored and adequately protected against loss or damage. Particular care shall be taken to protect and cover materials that are liable to be damaged by the elements.
- C. Due to limited on site storage space, each Contractor shall coordinate delivery of his materials with the Owner's Construction Representative who will determine when large deliveries shall be made and shall be designate storage locations on site for delivered materials. All stored materials must be stored in locked, watertight trailers, paid for by applicable contractor.

3.08 SCAFFOLDING AND STAGING

- A. All scaffold, staging and appurtenances thereto shall comply in total to the requirements of Safety and Health Regulations for Construction Chapter XVII of OSHA, Part 1926 and all related amendments.

3.09 RUBBISH CONTAINER

- A. Each Contractor shall provide suitable rubbish container device(s) for his own use (both demolition and construction debris), properly maintained and serviced, replaced as required and protected from access by the public fencing as may be specified herein or approved by the Architect and Owner's Construction Representative.
- B. Contractor and Subcontractor shall sweep up and gather together daily all his own rubbish and removed materials and place same in containers.

3.10 CONSTRUCTION FENCING

- A. Construction fencing and barriers shall be provided by the General Construction Contractor, enclosing all work and storage areas as outlined in staging, plan and specified within. Temporary construction fencing shall be of good quality and neat in appearance.
- B. Site access gates shall be provided as required, complete with all operating hardware and security devices.
- C. Should fencing be required to be relocated or modified during the course of the project due to additional access needed by the contractor, same shall be done at the total expense of the contractor.
- D. The construction fence shall be maintained in good order by all contractors throughout the life of the project.
- E. Note: Should any contractor damage or cause the need for repair to the construction fence, all costs involved with said repair will be back-charged to the contractor creating the need for repair.
- F. General Construction Contractor shall provide a 60' x 150' fenced staging area at the location designated on the drawing for use by all trades. All fenced areas to be 6' high galvanized chain link fencing, 9 ga fabric on 10' long framed sections on stanchions. Gate locations as directed by Owner's Construction Representative. If additional storage is necessary, the contractors may use the remote staging area where Owner's Construction Representative's trailer is located.

3.11 JANITORIAL SERVICE/DAILY CLEANUP

- A. Each Contractor shall furnish daily janitorial services for the project and perform any required maintenance of facilities as deemed necessary by the Architect and Owner's Construction Representative during the entire life of the contract. If any contractor fails to keep the site safe

and broom clean within 4 hours of being notified by Architect or Owner's Construction Representative, either verbally or in writing, the Owner's Construction Representative will have the cleanup work performed by others and the contractors will be back charged accordingly.

1. The Contractor shall provide daily trash collection and cleanup of the project area and shall dispose of all discarded debris, and the like in a manner approved by the Owner's Construction Representative.

3.12 BURNING

- A. Burning will not be permitted.

3.13 MAINTENANCE OF PERMANENT ROADWAYS

- A. The General Construction Contractor shall immediately remove dirt and debris which may collect on permanent roadways created by their work, deliveries, manpower, equipment, etc.
- B. Temporary roads / entrance mats will be maintained by General Construction Contractor to insure that no mud, dust, dirt goes onto asphalt areas.

3.14 FIRE PREVENTION CONTROL

- A. Each Contractor shall comply with the safety provisions of the National Fire Protection Association's "National Fire Codes" pertaining to the work and, particularly, in connection with any cutting or welding performed as part of the work.

3.15 TEMPORARY FIRE PROTECTION

- A. Each Contractor shall take all possible precautions for the prevention of fires.
 1. Where flame cutting torches, blow torches, or welding tools are required to be used, their use shall be as approved by the Owner's Construction Representative at the site.
 2. When welding tools or torches of any type are in use, have available in the immediate vicinity of the work a fire extinguisher of the dry chemical 20 lbs. Type. The fire extinguisher(s) shall be provided and maintained by the Contractor doing such work.
- B. Fuel for cutting and heating torches shall be gas only and shall be contained in Underwriters laboratory approved containers.
- C. Storage of gas shall be in locations as approved by the Owner and subject to Fire Department regulations and requirements.
- D. No volatile liquids shall be used for cleaning agents or as fuels for motorized equipment or tools within a building except with the express approval of the Owner and/or Architect and in accordance with local codes. On-site bulk storage of volatile liquids shall be outside the buildings at locations directed by the Owner, who shall determine the extent of volatile liquid allowed within the building at any given time.
- E. Each Contractor shall comply with the following requirements relating to compressed gas:
 1. Where compressed gas of any type is used for any purpose at the site, it shall be contained in cylinders complying with ICC regulations. Gases of different types shall not be stored together except when in use and when such proximity is required.
 2. All gas cylinders shall be stored in sheds constructed of noncombustible materials. Sheds shall be well ventilated and without electric lights or fixtures and shall be located as far from other buildings as is practicable. All gas cylinders not in actual use, or in proposed immediate use, shall be removed from the building under construction or reconstruction. Empty gas cylinders shall be removed prior to bringing in a replacement cylinder. Cylinders

- shall at all times be supported and braced in an upright position. When not in use, the protective cap shall be screwed over the valve.
3. All persons required to handle gas cylinders or to act as temporary firemen (Fire Watchers) shall be able to read, write and understand the English language; they shall also be required by the Contractor to read Part 3 of Pamphlet P-1 "Safe Handling of Compressed Gases" published by the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.
 4. Where local ordinances are in effect regarding gas cylinders, (their use, appurtenances and handling), such ordinances shall supplement the requirements of this paragraph. All personnel engaged in fire watch shall be certified by the Local Fire Department having jurisdiction.
 5. Any cylinder not having the proper ICC markings or re-inspection marking, or any cylinder with a leak shall be isolated immediately away from any building and the supplier shall be immediately notified; such other precautions as may be required to prevent damage or injury shall also be taken by the Contractor.
- F. Each Contractor shall comply with the following requirements relating to welding and cutting:
1. All cutting and/or welding (electric or gas) must be done only by skilled, certified and licensed personnel.
 2. During welding or cutting operations, a contractors man shall act as a fire watcher. The fire watcher shall have proper eye protection and suitable fire fighting equipment including fire extinguisher (bearing current inspection Certificate), protective gloves and any other equipment deemed necessary.
 3. Welding or cutting shall not be done near flammable liquid, vapors or tanks containing such material.
 4. Where cutting or welding is done above or adjacent to (within two feet) combustible material or persons, a shield of incombustible material shall be installed to protect against fire or injury to sparks or hot metal.
 5. Tanks supplying gases for welding or cutting are to be placed in an upright position securely fastened, and close as practical to the operation. Tanks, actives or spares, shall be protected from excess heat and shall not be placed in stairways, hallways or exits. When not in use, protective valve cap shall be screwed on the cylinder.
 6. Adequate fire extinguishing equipment shall be maintained at all welding or cutting operations.
 7. The Contractor shall secure all required inspections.
 8. All equipment, hoses, gauges, pressure reducing valves, torches, etc., shall be maintained in good working order and all defective equipment shall immediately be removed from the job.
 9. No person shall be permitted to do any welding or cutting until his name, address and current license number have been submitted in writing to the Owner.
- G. Contractors for work outside the building shall commence operations promptly on award of Contract, and shall be responsible for same being kept clear of materials and debris in connection with their own work and that of other Contractors. If a Contractor for outside work allows other contractors to deposit material and debris over its lines, the Contractor shall be responsible for all delay and extra cost occasioned thereby.

3.16 DISCONTINUE, CHANGES AND REMOVAL

- A. All Contractors shall:
1. Discontinue all temporary services required by the Contract when so directed by the Construction Manager or Architect.
 2. The discontinuance of any such temporary service prior to the completion of the work shall not render the Owner liable for any additional cost entailed thereby and each Contractor shall thereafter furnish, at no additional cost to the Owner, any and all temporary service required by such Contractors work.

3. Remove and relocate such temporary facilities as directed by the Construction Manager or the Architect without additional cost to the Owner, and shall restore the site and the work to a condition satisfactory to the Owner.

3.17 VENTILATION AND HUMIDITY CONTROL FOR CONSTRUCTION:

- A. General Construction Contractor will provide temporary ventilation as required for protecting the building from any adverse effects of high humidity during abatement and construction activities. Select dehumidification and ventilating equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements and have sufficient quantity of units to produce necessary ambient conditions.
 1. Each Contractor shall be responsible for his own temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity.
 2. Ventilate enclosed area to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.
 3. Provide equipment as necessary for air and fresh exchange for the work area per OSHA standards.
 4. Remove temporary ventilation equipment prior to the completion of construction.
 5. If Contractor fails to adequately ventilate the building during the construction, abatement / roofing process, thereby causing humidity and possible mold issues, the owner will hire others to properly address and deduct costs from the Contractor accordingly.
 6. General Construction Contractor will provide negative air machines of sufficient size/qty to fully ventilate the square footage of work areas and exhaust any dust/fumes through flexible duct hose to exterior top eliminate any odors / smoke.
 7. Any contractor that allows water infiltration into any building shall be held responsible for the cleanup and provision of commercial dehumidifiers of sufficient size and quantity to prevent the generation of mold spore growth. Failure on the contractors part to address this issue within 4 hours of notice, will result in the Owner hiring outside parties to accomplish the required work in order to insure a safe environment. Owner will subsequently backcharge the contractor responsible for the water infiltration for all associated costs of hiring this outside contractor to carry out the work required.

3.18 TEMPORARY ROADS AND PERMANENT PAVED AREAS:

- A. General Construction Contractor shall construct and maintain temporary road areas adequate to support loads and to withstand exposure to traffic during construction period. See staging plan for construction requirements, materials, thicknesses, locations, etc.
 1. Includes access for delivery through staging area to building work areas, and to equipment and storage areas and sheds.
 2. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
 3. Temporary areas are installed and/or maintained for access to all required areas of the sites.
 4. Contractors will be permitted to utilize existing campus roads, as designated (as segregated by the Owner - if required).
 5. Road Cleaning: Maintain roads and walkways in an acceptably clean condition. This includes the removal of debris daily, if required, and/or a minimum of once a week due to all project traffic. Road cleaning equipment to be wet/vacuum type. The General Construction Contractor will clean roads for debris from building-related activities.
 6. General Construction Contractor shall provide snow plowing of temporary road, parking area, access route, and a 5' walkway to office trailer. Provide snow removal and walking of walkways to Owner's Construction Representative office trailer. The school district will provide snow plowing of established routes.
 7. Staging Areas:

- a. Temporary parking by construction personnel shall be allowed only in areas so designated and confirmed with the District.
- b. Traffic Regulations:
 - 1) Access through Owner's entrances shall be limited. Confirm access locations and time frames with the District or Owner's Construction Representative when required.
 - 2) Utilize only entrances/temporary roads as designated.
 - 3) Maintain all District traffic regulations and site access.
 - 4) Construction parking will not be allowed adjacent to District buildings, additions or monuments. Construction parking will be located in areas designated by the District or Owner's Construction Representative.
 - 5) Construction employee parking to be located as directed by the Owner's Construction Representative.

3.19 TRAFFIC CONTROLS:

- A. General Construction Contractor shall provide temporary traffic controls at junction of temporary roads with public roads. Include warning signs for public traffic and "STOP" signs for entrance onto public roads, barricades, flagmen, etc. Comply with requirements of authorities having jurisdiction.

3.20 DEWATERING FACILITIES AND DRAINS

- A. Each Prime Contractor is directly responsible for dewatering of their excavations. The responsibility of dewatering of the site as to facilitate the work will be the responsibility of the General Construction Contractor, coordinate with the Owner's Construction Representative
- B. Comply with requirements in applicable Division 31 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, common use of dewatering and drainage facilities is recommended. 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 drainage systems. Provide temporary drainage where roofing or similar waterproof deck construction has been completed.
- C. Remove snow and ice, on a daily basis, to minimize accumulations.

3.21 ROOF PROTECTIONS

- A. The General Construction Contractor shall provide temporary protection on the roof surface when it is necessary for work to take place on completed roof areas. Other Primes shall be held responsible to notify the General Construction Contractor of their work and required roof protection areas.
- B. When requested by other trades as noted above, the General Construction Contractor shall provide a minimum of 2 inch thick Polyisocyanurate or Extruded Polystyrene (40 psi) rigid insulation with a 5/8" plywood overlay to protect existing roofing system from damage. Provide removable weighting systems to protect against wind uplift / blow-offs of these protective materials.
- C. Based upon the requirements noted above, the General Construction Contractor shall assume responsibility for any damage(s) to the roofing system caused by the work of other trades, except that financial responsibility for any damage(s) to the roofing system shall be that of the Contractor responsible for the damage(s) as determined by the Owner's Construction Representative.

3.22 SIGNAGE

- A. The General Construction Contractor shall provide signs as required below. Install signs where required or indicated to inform public and persons seeking entrance to project site. All signage and posts provided shall become the property of the District at the conclusion of the project.
- B. Prepare temporary signs to provide directional information to construction personnel and visitors.
- C. Construct signs in accordance with section 619 of the NYS DOT standard specifications (MUTCD overall sign size, letter size, metal signage). Support on breakaway metal posts or attach to fencing using zip ties to prevent unauthorized removal; do not attach signs to buildings or permanent construction.
- D. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer. Engage an experienced sign painter or fabricator to apply graphics. Signs shall have an orange background with black letters/graphics unless directed otherwise.
- E. Include relocating temporary site safety and directional signs as many times as required or directed by the Owner's Construction Representative.
- F. The General Construction Contractor shall furnish, install and relocate all construction signage as required at each project site.
- G. Project Sign Requirements:
 - 1. Ten (10) signs shall be provided and located (and relocated) as designated by the District or Owner's Construction Representative for construction traffic control/flow at entrances/exits.
 - 2. Four (4) signs for "Construction Parking".
 - 3. Four (4) signs to direct deliveries
 - 4. Ten (10) signs for "Emergency egress only - Construction Area" per OSHA standards.
 - 5. Ten (10) signs for "No Smoking" safe work site at multiple locations as directed by Owner's Construction Representative.
 - 6. Fifteen (15) signs for "Construction Area - Do Not Enter" mount on fence as directed by the Owner's Construction Representative.
 - 7. Ten (10) signs for "No Trespassing" mounted on construction fence as directed by the Owner's Construction Representative.
- H. A pre-mobilization meeting to establish location and quantities of all signage will be held with contractor, Construction Manager, and the Owner. Prior to the start of any actual work the signage must be reviewed / approved by the Owner's Construction Representative.

3.23 ENVIRONMENTAL PROTECTION:

- A. The General Construction Contractor shall provide protection, operate temporary facilities, and conduct construction with means and methods that comply with local and state environmental regulations and that minimize possible air, waterway, and subsoil contamination, pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict the use of noise-producing tools and equipment to hours that will minimize complaints from persons, residential occupants, or firms near Project site.

3.24 STORMWATER CONTROL

- A. The General Construction Contractor shall provide earthen embankments, silt fencing, haybales, and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater.

3.25 SECURITY ENCLOSURE AND LOCKUP:

- A. Each Contractor shall provide protection and security for partially completed areas of construction. Provide barricades to prevent unauthorized access, vandalism, theft, and similar violations of security.

3.26 BARRICADES, WARNING SIGNS AND LIGHTS:

- A. Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard.
 - 1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior grade APA BC plywood with structurally adequate supports and/or scaffolding as approved by the Owner's Construction Representative.

3.27 TEMPORARY ENCLOSURES

- A. The General Construction Contractor shall provide temporary enclosures for protection of construction from exposure to inclement weather and for safety of any roof related openings. Close openings in roof deck with load bearing wood frame construction members (sized for design roof loads), 5/8" exterior grade, structural 1, APA BC plywood and watertight EPDM adhered membrane.
- B. The General Construction Contractor shall fully enclose all windows / door openings. Maintain access and egress for workers via secured temporary doors / gates. During periods of temporary heat provisions, provide 5/8 inch, exterior grade, APA BC plywood with 2 inch rigid polyisocyanurate and 6 mil polyethylene sheeting for a weather-tight, secure and insulated enclosure. Temporary doors shall each have an exit device and door closer.
- C. Any other temporary enclosures for specific openings for any contractor to perform their work shall be the responsibility of the contractor requiring / creating the opening. These openings shall be installed to protect the building from exterior elements, security issues, odors and noise resulting from construction operations.

3.28 TEMPORARY PARTITIONS

- A. The General Construction Contractor shall erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate work areas.
 - 1. Construct dustproof, floor to ceiling partitions of not less than 3-5/8" - 20 ga. studs; 2 layers of 6 mil fire-retardant polyethylene sheets inside / outside; 5/8 inch thick exterior grade plywood sheathing; 5/8 inch thick interior, Type X gypsum board, taped spackled (1 coat) and painted.
 - 2. Cover floor with 2 layer fire retardant polyethylene and extend 18 inches vertically at each side. Overlap and tape all joints.
 - 3. Sound insulate partitions to provide noise protection to occupied areas
 - 4. Caulk joints and perimeter to prevent dust migration. Equip partitions with dustproof doors and security locks.
 - 5. In addition to any temporary partition locations shown on drawings, the General Construction Contractor shall include in its base bid a minimum of six (6), 9 foot by 12

foot temporary partitions meeting criteria listed above for use and located where directed by the Owner's Construction Representative. Each location shall be equipped with a 3 foot wide by 7 foot high hollow metal door/frame with hinges, closer and exit device hardware.

3.29 AREA OF SPECIAL PROTECTION

- A. In the event of an emergency (designated by the sounding of the fire alarm system) all construction activities must immediately cease. Contractor's work force will evacuate themselves from work areas and remain outside of work areas until the "all clear" is given. No work operations will be tolerated during the evacuation of the building or during an emergency.
- B. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.30 OPERATION, TERMINATION AND REMOVAL:

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage.
 - 1. Maintain operation of temporary enclosures on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Protection: Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended and no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been affected because of interference with the temporary construction / facilities. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the property and responsibility of the General Construction Contractor.
 - 2. At Substantial Completion, clean, repair and renovate permanent facilities used during the construction period.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The Work of this Section includes the furnishing of the Owner's Construction Representative's Field Office (Trailer).
 - 1. The Owner's Construction Representative's Field Office shall be furnished by the General Construction Contractor.
 - 2. It shall be provided within the time period specified hereinafter.
- B. The General Construction Contractor shall also furnish the following to the Owner/ Owner's Construction Representative's all in accordance with the specifications contained herein as follows:
 - 1. Miscellaneous equipment and supplies
 - 2. Materials
 - 3. Computer system with associated peripheral computer related equipment
 - 4. Services as may be specified herein.
- C. The Electrical Contractor shall install two (2) new telephone services (telephone and fax/modem) for the exclusive use of the Owner's Construction Representative's. The telephone services shall be provided to the Construction Manager's construction trailer located on the site as selected by the Owner's Construction Representative's. The costs associated with providing the Owner's Construction Representative's's telephone services shall be included in the price as-bid and is not eligible for payment out of any cash allowance.
- D. This Section also specifies the requirements for Field Offices to be established by all Prime Contractors for the exclusive use of the respective Prime Contractor.

1.02 CARE AND PLACEMENT

- A. Field offices shall be placed where directed by the Owner's Construction Representatives's in accordance with site utilization requirements.
- B. All field offices shall be installed to meet all standards of the Occupational Safety and Health Act of 1970 and subsequent revisions.
- C. In the event of damage to existing facilities, including but not limited to: tanks, driveways, walks, pavement, buildings, pipes, conduits, valves, and electrical facilities then immediately make all repairs and replacements to an equal condition prior to the event.

1.03 QUALITY PERFORMANCE

- A. Comply with and perform all work in accordance with the requirements of local authorities and utility companies having jurisdiction.

1.04 SUBMITTALS

- A. The General Construction Contractor shall submit the following:
 - 1. Floor plan of the proposed Field Office of the Owner's Construction Representative's.
 - 2. Catalog cuts of miscellaneous equipment and supplies if they are different from that specified.
- B. The Contractor shall also provide a listing of the companies providing specified services with telephone number and contact name. Provide references for each company when requested.

PART 2 - PRODUCTS

2.01 OFFICE OF PRIME CONTRACTORS

- A. The General Construction and the other Prime Contractors shall provide and maintain during the life of this contract separate and suitable offices at the site that shall be used as the Contractor's superintendent office.
- B. Provide adequate facilities for maintaining record documents, for holding small meetings and a telephone upon which calls may be received from Owner, Architect and others. The telephone shall be equipped with a fax machine and an answering machine.
- C. Each Contractor shall install, maintain, and repair if necessary, temporary electric and telephone to their own field office.

2.02 MATERIALS, EQUIPMENT AND SERVICES FURNISHED TO THE OWNER BY THE GENERAL CONSTRUCTION CONTRACTOR

- A. The General Construction Contractor shall also furnish the following equipment and services that shall not be eligible under any cash allowance. All items specified herein shall be new and remain the property of the Owner unless otherwise stated. The following shall be furnished:
 - 1. Two (2) 23-gallon plastic wastepaper basket.
 - 2. New 50-person industrial first aid station, OSHA approved, by Acme United or equal, order no. ACM-1403 (Huntington Business Products) or equal.
 - 3. Thermometer, with indoor and outdoor sensing bulbs, and high, low instantaneous reading, with magnetic reset function by Radio Shack or equal.
 - 4. Two U.L. and F.M. approved fire extinguishers with a minimum rating of 4A-60B:C.
 - 5. Standard manufacturer operating manuals for all equipment supplied.
 - 6. One (1) 30" x 60" desk with 4 side drawers and a locking center drawer.
 - 7. One (1) new swivel task chair for use with desk equal to order no. SUP-12223643 by Superior Chair (Huntington Business Products).
 - 8. One (1) new rolling stand with top, Model No. 76MR/76TP from Plan Hold, catalog #27, or equal.
 - 9. Two (2) 48" x 60" reference tables.
 - 10. Six (6) folding chairs.
- B. Janitorial Services - Provide janitorial services two (2) times each week. Thoroughly clean and dust entire office and leave in a condition satisfactory to Architect. Provide this service through final completion.
- C. Ownership of Furnishings - All items to be provided by Contractor under this paragraph shall remain the property of the Owner unless otherwise stated.
- D. Internet Access Service - The Contractor shall also pay for monthly Internet access fees at a cost not to exceed \$45.00 per month for the length of the contract up to the date of final completion.
 - 1. This cost shall be included in the price as bid and shall be billed directly to the General Construction Contractor.
 - 2. The service provider shall be selected by the Architect. The General Construction Contractor shall arrange for the service.
 - 3. Internet access will be used by the Architect and the Owner to send email to manufacturers, vendors, Architect's home office, the Contractor's home office, other prime Contractors, regulatory agencies and the like.
 - 4. The Contractor may use this service at the discretion of the Architect. Only project related transmissions will be allowed.

5. If high speed DSL or cable service is available, then the Contractor shall arrange for this service in lieu of a dial up service.
- E. All items specified herein are subject to the approval of the Architect or the Owner's Construction Representative's.
- F. Equipment shall be delivered to the site and turned over to the Architect via a type written transmittal form.
- G. All equipment that is to remain the property of the Contractor shall be new.
 1. Equipment that is to remain the property of the Owner shall also be new and be provided in it's factory packaging, unopened until delivered to the Owner/Architect.
 2. Maintenance of all supplied equipment shall be the Contractor's responsibility up to substantial completion.
- H. All items shall be delivered prior to the first application for payment, but no later than the day the Owner's Construction Representative's's Trailer is delivered.
- I. Construction Manager's Field Trailer:
 1. Office - The General Construction Contractor shall furnish, equip, and maintain a field office at the site for the exclusive use of Owner/Architect.
 - a. The field office shall be of substantial weatherproof construction, with a usable floor space of not less than 10' x 40' overall.
 - b. Office may be in an approved, near new condition, independent trailer, completely skirted with insulation and with sufficient landings and stairs at each door.
 - c. Submit a scaled floor plan of the trailer.
 2. Duration - Provide office by no later than 30 calendar days from the date of the Notice To Proceed and maintained during the life of the Contract, up to the date of the Final Certificate.
 3. Location - As directed by Owner/Architect or Owner's Construction Representative's. Relocate during the progress of the work, without additional cost to Owner, as may be required by the Owner/Architect or Owner's Construction Representative's.
 4. Utilities - Provide the following in sufficient size, quantity, and capacity, as approved by the Owner/Architect.
 - a. Windows for natural light and ventilation, with locks, screens, and shades or curtains.
 - b. Lighting acceptable to the Owner/Architect/Owner's Construction Representative's.
 - c. Door with screen, with hasp and padlock and five keys for Owner/Architect's use. Two (2) doors minimum. Provide two (2) commercial grade foot mats at each door.
 - d. Air conditioning unit and heater in each room, sized to maintain an indoor temperature of 60 deg. F with an outdoor temperature range of 10 deg. F to 90 deg. F.
 - e. 110 volts, 100-amp electric service with sufficient receptacles spaced around the room.

2.03 REMOVALS

- A. Remove all items provided under this Section except as otherwise specified.

PART 3 - EXECUTION

3.01 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities and materials.
- B. Remove underground installations to a minimum depth of 2 feet or as specified elsewhere.

- C. Regrade area to existing slope and elevation and restore the surface to its existing condition or to the condition shown on the Contract Drawings.
- D. The General Construction Contractor shall inventory all equipment that has been turned back to the Contractor prior to agreeing to final payment.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes the general requirements for products that are to be furnished, installed, or otherwise incorporated into the project.

1.02 QUALITY ASSURANCE APPLIES TO ALL PRODUCTS

- A. In addition to the Contractor's warranties and guarantees on materials and equipment required under the General Conditions of the Contract and the Technical Specifications contained hereinafter, the Contractor shall also be responsible for all materials, equipment, and products that have or is planned to be incorporated into the work.
 - 1. The Contractor shall be responsible for the finished work and that it accurately and completely complies with these Contract Documents.
 - 2. The Contractor shall be responsible for work performed by subcontractors, equipment suppliers, and material vendors.
 - 3. The Contractor shall be satisfied as to the product's performance before it is ordered for installation. At the Contractor's option, he/she shall have tested each product to determine compliance with these specifications.
- B. The Architect may check all or any portion of the work and the Contractor shall afford all necessary assistance to the Architect in carrying out such checks.
 - 1. Such checking by the Architect shall not relieve the Contractor of any responsibilities for the accuracy or completeness of the work.
 - 2. Such checking is a courtesy service being provided by the Owner and does not relieve the Contractor of his/her responsibilities under this Construction Contract.
- C. If witnessed shop tests or inspections are required at the point of manufacture, the Contractor shall keep the Architect advised as to the progress of the work to allow inspection at the proper time and place. Provide at least two (2) weeks advance notice before scheduled shop tests.
- D. Should a dispute arise as to the quality of workmanship, equipment or material performance, then the final decision regarding acceptability with these Contract Documents shall be that of the Owner.
- E. At the request of the Architect, the Contractor shall promptly provide the services of a competent representative of the manufacturer at the project site, fully equipped and prepared to answer questions, perform tests, make adjustments and to prove compliance with the Contract Documents free of all additional charges. Proof of compliance shall be the responsibility of the Contractor, and such special visits to the project site by the manufacturer shall not be eligible under any cash allowances or stipulated man-hours necessary to startup the system and/or train the Owner as may be specified in the Technical Specifications.

1.03 QUALITY ASSURANCE - EQUIPMENT

- A. Erect and install products under the supervision of a competent and experienced superintendent. The method of installation, including anchorage, clearances, and tolerances for rotating assemblies, methods of support for equipment and adjacent piping, shall be as recommended by the equipment manufacturer unless detailed on the Drawings or specified.
- B. All material furnished shall be new, and guaranteed free from defects in workmanship, installation, and design.
- C. Design and fabricate equipment in conformance with ANSI, ASTM, ASME, ASHRAE, IEEE, NEC and NEMA Standards.

1. Equipment shall withstand the stresses that may occur during fabrication, testing, transportation, installation and conditions of operation.
 2. Pumps shall conform to the requirements of the Hydraulic Institute.
 3. Equipment shall comply with the latest OSHA regulations and the ANSI Safety Standards.
- D. Equipment shall be products of manufacturers who produce evidence of their ability to promptly furnish any and all interchangeable replacement parts as may be needed at any time within the expected life of the equipment.
- E. Manufacturers shall also have readily available access to suitable and accurate testing facilities for performing the required shop tests.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Equipment shall have been in successful regular operation under comparable conditions for a period of at least five (5) years.
1. This time requirement does not apply when the manufacturer posts an Owner/Architect acceptable Performance Bond or Letter of Credit for the duration of the time period that will guarantee replacement of the equipment in the event of failure.
 2. The bond shall be in a form that is acceptable to the Owner's legal council.
- B. The Owner reserves the right to reject any material or equipment manufacturer who, although he appears to be qualified and meets the technical requirements, does not provide satisfactory evidence indicating adequate and prompt post-installation repair and maintenance service, as required to suit the operational requirements of the Owner.
- C. Whenever it is required that the Contractor furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable on the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required.
- D. Perform work in full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.
- E. Items of any one type of material or equipment shall be the product of a single manufacturer.
1. For ease of the Owner in maintaining and obtaining service for equipment and for obtaining spare parts from as few places as possible, to the maximum extent possible, use equipment of a single manufacturer.
 2. The Architect reserves the right to reject any equipment from various manufacturers if suitable equipment can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.
- F. Substitute equipment shall not be fabricated nor installed until after written decision to accept request is received from the Architect.

2.02 NAMEPLATES

- A. Each unit of equipment shall have the manufacturer's name or trademark on a stainless steel nameplate securely affixed in a conspicuous place.
- B. The manufacturer's name or trademark may be cast integrally with stamp, or otherwise permanently marked upon the item of equipment.

- C. Such other information as the manufacturer may consider necessary for complete identification shall be shown on the nameplate.

2.03 FABRICATIONS

- A. Insofar as possible, shop prefabricate all items complete and ready for installation.
- B. Accurately fabricate all items to the details shown on the Drawings and on the shop drawings found in compliance with the Contract Documents.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prior to work under any Section, carefully inspect the work of all other prime trades and verify that all such work is in conformance with the Contract Documents and is complete to the point where the work under that Section may properly commence.
- B. Avoid the need to remove and replace work and to avoid unnecessary cutting and patching.
- C. Inspect all surfaces to be sure that they have been properly prepared before applying new work to such surfaces.
- D. Verify that all work can be installed in strict accordance with the drawings and the approved shop drawings. Immediately report discrepancies to Architect.
- E. Do not proceed with the work under any Section until these conditions are obtained.

3.02 INSTALLATION

- A. Furnish and install materials and equipment in accordance with the instructions of the applicable manufacturer, fabricator or processors, except as otherwise provided in the Contract Documents.
- B. All work shall be done in a workmanlike manner and set to proper lines and grades. The work shall be square, plumb and/or level as the case may be.
- C. Where performance criteria are specified, do all work necessary to attain the required end results.

3.03 FIELD QUALITY CONTROL

- A. Neither observations by Architect nor inspections, tests or approvals by other persons shall relieve the Contractor from his obligations to perform the work in accordance with the requirements of the Contract Documents.
- B. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any work to specifically be inspected, tested or approved by some public body, the Contractor shall assume full responsibility therefore, pay all costs in connection therewith, and furnish the Architect with the required certificates of inspection, testing or approval.
- C. The Owner reserves the right to independently perform laboratory tests on random samples of material or performance tests on equipment delivered to the site.
 - 1. These tests, if made, will be conducted in accordance with the appropriate referenced standards or specification requirements.

2. The entire shipment represented by a given sample, samples or piece of equipment may be rejected on the basis of the failure of samples or pieces of equipment to meet specified test requirements.
3. All rejected materials or equipment shall be removed from the site, whether stored or installed in the work, and the required replacements shall be made, all at no additional cost to Owner.

3.04 ADJUST AND CLEAN

- A. Upon the completion of installations, and as a condition of its acceptance, visually inspect all work, adjust all components for proper alignment and touch-up abrasions and scratches to make them completely invisible.
- B. Thoroughly examine all materials and equipment with protective or decorative finishes for defects and damage prior to being covered.
 1. In the case of buried items of work, restore protective surface covers so as to conform to the Contract Documents prior to being backfilled, buried or embedded, as the case may be.
 2. In the case of exposed items of work, for which a decorative finish is required, all scratches, discoloration's, unmatched colors, disfigurements and damages shall be repaired and touched-up so as to provide a neat, clean finish, and be uniform in color.

3.05 UNCOVERING WORK

- A. Unless otherwise specified or directed by Architect, no work shall be covered until it has been observed, tested, photographed, measured, and authorized to be covered by Architect.
- B. Tie distances to above ground physical structures as reference points to all underground utilities, conduits, pits, manholes, valves, and pipelines shall be obtained by the Contractor prior to covering the work. Immediately comply with the Architect's direction to uncover the work if tie distances were not obtained.
- C. If any work has been covered with Architect's consent and Architect considers it necessary or advisable that covered work be observed or tested, the Contractor, at Architect's request, shall uncover, expose or otherwise make available for observation, or testing as Architect may require, that portion of the work in question, furnishing all necessary labor, material and equipment.
 1. If it is found that such work is defective, the Contractor shall bear all the expenses of such uncovering, exposure, observation, and testing of satisfactory reconstruction, including compensation for additional engineering services and an appropriate deductive change order shall be issued.
 2. If, however, such work is not found to be defective, the Contractor shall be allowed an increase in the contract price or an extension of the contract time, or both, directly attributable to such uncovering, exposure, observation, testing and reconstruction if he makes a claim therefore as provided in the General Conditions.

3.06 DEFECTIVE WORK

- A. The repair, removal, replacement and correction of defective work is a part of this Contract and shall be promptly performed in accordance with the requirements set forth in the General Conditions or other portions of the Contract Documents. All costs in connection with the correction of defective work shall be borne by the Contractor.

- B. Products that fail to maintain the performance or other salient requirements of the Contract Documents, shows undue wear, or other deleterious effects during the maintenance period, shall be considered defective.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The Section includes the transportation, handling, storage and protection of products that are to be incorporated into the work.
- B. The procedures for turning equipment over to the Owner for installation by others is also included herein.

1.02 GENERAL

- A. Items shall be delivered as complete assemblies direct from the manufacturer with all internal wiring, piping, valving, and control devices intact except where partial disassembly is required by transportation regulations, protection of components, or where physical constraints may exist or be created for the setting of the item.
- B. Coordinate the disassembly and reassembly requirements with the manufacturer. Determine the need and extent of reassembly prior to bid.
 - 1. All labor, material and equipment costs associated with the disassembly and reassembly of the product shall be included in the Contract Price.
 - 2. Where reassembly of equipment is necessary, then the manufacturer shall provide reassembly instruction at the project site.
 - 3. A technician shall be present during the entire reassembly procedure and the manufacturer shall certify, in writing, that the unit was reassembled properly in accordance with instructions provided by the manufacturer and that all as-specified warranties remain in effect.
 - 4. The manufacturer's reassembly inspection time shall be in addition to the field service time specified and shall be included in the Contract Price. This time shall not be eligible for payment under any cash allowance item.
- C. In the case where equipment is to be installed by others, then the supplying contractor shall be responsible for its reassembly. If reassembly is necessary and the unit(s) are to be set inside an enclosure or building, reassemble the equipment inside said enclosure. The equipment once reassembled shall be turned over to the installing contractor as specified below.

1.03 PACKING

- A. Transport products in containers, crates, boxes or similar means such that the products are protected against damage that may occur during transportation.
- B. All parts shall be packaged separately or in container where parts of similar systems are grouped.
- C. Part numbers shall be indicated on the individual part. Use indelible ink to mark part numbers.
- D. All equipment shipments shall be included with a parts list showing a description (name) of the part and the manufacturer's part number.
 - 1. The parts list shall be shipped in a plastic zippered envelope with the words "Parts List" lettered on it in indelible ink.
 - 2. The parts list shall be placed inside the shipping container so that it is on the top of the contents.
- E. Equipment shall be shipped with storage, handling and installation instructions.

1. The Architect reserves the right to withhold payment for equipment delivered to the site until such time as the storage, handling and installation instructions are supplied by the manufacturer.
 2. In the case where operation and maintenance manuals have been provided by the manufacturer, which includes the installation instructions, then the installation instructions shall also be included with the equipment shipment.
- F. Delicate instruments and devices, reagents, chemicals, and glassware shall be shipped in packaging normally provided by the manufacturer.
- G. The Contractor shall require the manufacturer to be responsible for the proper packing of all products.

1.04 SHIPPING AND DELIVERY

- A. Product deliveries shall be accompanied with a bill of lading indicating the place of origination and the Contractor's purchase order number.
- B. Inspect shipments immediately upon delivery, to assure compliance with requirements of the Contract Documents and those products are undamaged.
- C. Promptly remove damaged material and unsuitable items from the job site.
- D. Provide equipment and personnel to handle products by methods to prevent soiling; disfigurement or damage.

1.05 STORAGE

- A. Store sensitive products and all spare parts in weather tight, climate controlled enclosures in an environment favorable to product.
- B. Store and protect products in accordance with the manufacturer's instructions.
- C. All other products that are to be installed underground or products such as pipe, valves, and fittings shall be stored outdoors but shall be blocked off the ground and covered with impervious sheet coverings.
- D. Store fabricated products above the ground on blocking or skids.
- E. Store loose granular materials in well-drained areas on solid surfaces to prevent mixing with foreign matter.
- F. Provide adequate ventilation to avoid condensation.
- G. In accordance with manufacturer's instructions protect bearings, couplings, shafts, rotating components, and assemblies. Protection of said equipment shall be continuous until the time the equipment is placed into permanent service.
- H. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
- I. Do not store volatile liquids in any building on site.
- J. Storage of products shall be the responsibility of the supplying contractor. The installing contractor shall take all necessary precautions to protect the equipment being furnished by others.

- K. Store with seals and labels intact and legible.

1.06 EQUIPMENT INSTALLED BY OTHERS

- A. All products, except products noted on the Drawings or specified, shall be furnished and installed under this Contract.
 - 1. Only noted or specified products shall be furnished under this Contract for installation by others.
 - 2. If it is not noted on the Drawings or specified, then the product shall be furnished and installed under the Contract.
- B. The Contractor shall furnish these products to the Owner. These products shall be stored as specified above.
- C. The Owner will then advise the installing contractor that the product(s) are ready for installation.
 - 1. In the case where the product is stored in a proper enclosure, but not stored inside the building to be constructed under this project, then the installing contractor shall move the product into the building to a location adjacent to the final location shown on the Drawings.
 - 2. In all cases, the installing contractor shall be responsible for moving from storage, uncrating, anchoring, mounting and installing the product as required by the Contract Documents.
- D. The Contractor and installing contractor(s) shall be present at the time the equipment is turned over to the Owner. Immediately thereafter, the Owner will turn the product over to the installing contractor for installation.
- E. The Owner, Contractor, Architect and the installing contractor shall inspect the condition of the product at this time.
 - 1. Any defects in the product will be noted and the Contractor will be advised to make all repairs immediately.
 - 2. The installing contractor shall still be required to install the product if the damage is deemed cosmetic by the Architect.
 - 3. The manufacturer's installation instructions or wiring diagram shall be turned over to the installing contractor at this time by the Contractor.
 - 4. Any damage occurring to the product during moving, setting and mounting the unit(s) shall be the responsibility of the installing contractor.
 - 5. The Contractor is advised to take photographs to document the condition prior to it being turned over to the installing contractor.
 - 6. The installing contractor is advised to take photographs to document the condition prior to its acceptance.
- F. The supplied unit(s) remain the property of the Contractor until final acceptance of the work.
- G. Any damage caused to the unit(s) due to improper installation, workmanship, and non-compliance with the manufacturer's written installation instructions shall be the responsibility of the contractor who caused said damage. The burden of proof shall rest with the supplying Contractor.
- H. In the event the Contractor discovers misuse, abuse or improper installation of the unit(s) by the installing contractor, then he shall immediately notify the Architect in writing. The Architect will investigate the accusations and make a determination. The Architect's determination shall be binding and agreed to by both parties.
- I. If the Architect's determination substantiates the accusations of the Contractor, then the Contractor shall install the unit(s), the costs for which will be paid for as extra work. All costs

associated with the extra work change order, including engineering and attorney fees of the Owner and Contractor will be deducted from money due the installing contractor.

1.07 PROTECTION OF WORK

- A. The Contractor shall protect the installed work. All costs for protection shall be borne by the Contractor. Provide coverings as necessary to protect installed products from damage, from traffic and subsequent construction operations. Remove when no longer needed.
- B. Cover and protect equipment from dust, moisture or physical damage. Protect finished floor surfaces prior to allowing equipment or materials to be moved over such surfaces. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.
- C. Additional time required to secure replacements and to make repairs will not be considered by the Architect to justify any extension in the Contract Time of Completion. In the event of the damage, promptly make replacement and repairs to the approval of the Architect at no additional costs.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section This Section includes administrative and procedural requirements for cutting and patching.
- B. Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition, and does not apply to new construction procedures, except when new construction is already completed and must be cut and patched due to incorrect sequencing of work and/or improper coordination.
- C. Provisions of this Section apply to the construction activities of each prime Contractor. Contractors are reminded that they will need to hire tradesman skilled in the patching finishes that are impacted by their activities. (e.g. plumber will need to have a mason patch back existing walls opened for new roughing , Mechanical Contractor will hire carpenter for existing ceiling replacements after new air handler installed, etc)
- D. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section 013100 - PANELBOARDS for procedures for coordinating cutting and patching with other construction activities.
 - 2. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements of this Section apply to all trades. Refer to specification sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.02 RESPONSIBILITIES

- A. General: Each Prime Contractor is responsible to perform cutting and patching for their portion of the Work. Patching work shall restore all surfaces to their original condition.
- B. Cutting and patching of completed new construction required due to out of sequence construction and/or improper coordination is the responsibility of the prime Contractor responsible for the out of sequence construction or improper coordination. Cutting and patching of new construction for these purposes shall be accomplished by the General Construction Contractor and shall be paid for by the prime Contractor responsible. The Owner's Construction Representative shall be the sole judge of the responsibility for such cutting and patching, and shall prepare change orders to delete monies from the responsible prime Contract and credit those monies to the General Construction Contractor.
 - 1. Each Contractor shall cooperate with the Owner's Construction Representative to accomplish cutting and patching with minimal disruption to the construction and at reasonable cost.

1.03 SUBMITTALS

- A. Cutting and Patching Plan: If the Owner requires approval of cutting and patching procedures before proceeding, submit a plan describing cutting and patching procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:
 - 1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
 - 2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

3. List products to be used and firms or entities that will perform the work.
4. Indicate dates when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated, including their new locations, and those that will be required to be placed temporarily out-of-service. Indicate how long service will be disrupted and when service will be restored..
6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of additional reinforcement with the original structure.
 - a. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of unsatisfactory work.
 - b. Submit a detailed plan, including an area-specific drawing, indicating how dust mitigation and noise control will be handled to prevent disruption/dusting of adjacent areas. Identify routes of waste removal and dumpster locations, material handling from staging area, placement of protections, controls, etc.

1.04 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Bearing and retaining walls.
 - b. Structural concrete.
 - c. Structural steel.
 - d. Lintels.
 - e. Structural decking.
 - f. Miscellaneous structural metals.
 - g. Equipment supports.
 - h. Piping, ductwork, vessels, and equipment
- B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
 1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. Primary operational systems and equipment.
 - b. Air or smoke barriers.
 - c. Water, moisture, or vapor barriers.
 - d. Membranes and flashings.
 - e. Fire protection systems.
 - f. Noise and vibration control elements and systems.
 - g. Control systems.
 - h. Communication systems.
 - i. Electrical wiring systems.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.

1.05 WARRANTY

- A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner so as not to void any existing or required warranties.
- B. Utilize manufacturer certified installers for work on any existing roof area, which are impacted, to ensure that the owners current warranty is maintained in full force.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible. If identical materials are not available or cannot be used, use materials whose installed performance will be equal to or surpass that of the existing materials.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
 - 1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including but not limited to; Architect / Construction Manager, mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut, including shoring, lumber, plywood, etc.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with the use of adjoining areas or interruption of free passage to adjoining areas.
- D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

- B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
 - 1. In general, where cutting, use hand or small power tools designed for sawing or 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. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
 - 4. Comply with requirements of applicable Division 31 Sections where cutting and patching requires excavating and backfilling.
 - 5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible or to match existing where exposed for aesthetic appearance. Comply with specified tolerances. Patching will be done utilizing tradesmen skilled for the surface to be patched. (e.g. mason for brickwork, ceramic tile installer for ceramic tile, etc)
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 - 2. 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. If patched area does not match the adjacent surface, the contractor will refinish the entire wall to achieve a uniform surface.
 - 3. Where removal of walls or partitions extends one finished area into another, patch and repair floor, ceiling and wall surfaces in the new space. Provide an aligned, flush surface of uniform color and appearance. Provide grinding, leveling and/or self-leveling of surfaces since adjacent room surfaces may vary in elevation. Remove existing floor and wall coverings and ceiling materials and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
 - 4. Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.04 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying primer and paint or other finishing materials. Restore damaged pipe covering to its original condition

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Waste Management Goals for the Project
 - 1. A minimum of 75% construction waste materials by weight produced from this project to be recycled.
- B. This document includes:
 - 1. Requirements and procedures for compliance with United States Green Building Council (USGBC) LEED New Construction (NC), Version 2009 Credit MR 2 (Construction Waste Management).

1.02 RELATED SECTIONS

- A. All sections of the Specifications related to the demolition & construction of the building.

1.03 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 and site improvement materials resulting from demolition or selective 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 & Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 SUBMITTALS

- A. Waste Management Plan: Submit three copies of plan within 30 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction 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.

- C. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. 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.
- G. 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.
- H. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- I. Qualification Data: For Waste Management Coordinator and refrigerant recovery technician.
- J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.05 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- 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.

1.06 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

- B. Waste Identification: Indicate anticipated types and quantities of 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.
- D. 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.
- E. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
- F. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
- G. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
- H. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
- I. 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

2.01 NOT USED

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Architect. 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. Coordinator shall be present at Project site full time for duration of Project.
- 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 3 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.

3.02 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Sale and Donation: Not permitted on Project site.

3.03 RECYCLING DEMOLITION AND CONSTRUCTION WASTE

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. 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.
 2. Inspect containers and bins for contamination and remove contaminated materials if found.
 3. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 4. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 5. Store components off the ground and protect from the weather.
 6. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.04 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 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.

3.05 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 unless the proper permits are obtained and there is a designated area on the Owners property.
- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Cleaning during the progress of the work.
- B. Maintain all premises and public properties/roadways free from accumulations of waste, debris, dirt, mud and rubbish caused by operations on a daily basis.
- C. At completion of work, remove waste materials, rubbish tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave project clean, dust free and ready for occupancy,
- D. Remove all overspray caused by construction operations from adjacent construction, surfaces and vehicles.
- E. Cleaning prior to final payment

1.02 SCHEDULING

- A. Sequence, schedule, and coordinate final cleaning work with the final cleaning work to be performed by other prime contractors.

1.03 SAFETY REQUIREMENTS

- A. Standards: Maintain project in accord with OSHA and other applicable safety and insurance standards.
- B. Hazard Control / Cleaning Products:
 - 1. Store volatile organic containing / flammable waste in covered metal containers and remove from premises daily.
 - 2. Provide adequate ventilation during use of VOC containing or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances, OTC regulations and local anti-pollution laws and ordinances.
- D. Dispose of all waste legally, off-site.
- E. Do not dispose of VOC / flammable waste such as mineral spirits, oil, or paint thinners into storm or sanitary drains.
- F. Do not burn or bury rubbish and waste materials on project site.
- G. Do not dispose of any waste into surface waters such as ponds, lakes, streams or waterways

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cleaning materials shall be appropriate to the surface and materials being cleaned.
- B. Materials: Use only cleaning materials recommended by manufacturer of surface to be cleaned
- C. Provide pads to protect finished surfaces from cleaning materials.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Post signs to advise building occupants if wet and/or slippery floor conditions exist during cleaning operations.

3.02 PROGRESS CLEANING

- A. Keep all buildings, enclosures, and confined areas where work is being performed under the Contract free from unattended combustible materials.
- B. Remove rust spots as they develop.
- C. Execute daily cleaning to ensure that building, grounds, and public properties and roadways are maintained free from accumulations of waste materials, rubbish, dirt, mud and dust.
- D. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- E. Each day, each contractor shall adhere to the following:
 - 1. Areas of intense activity, such as cutting and sawing must be swept clean and reorganized at the end of each day. Utilize dust control methods such as plastic containment enclosures and/or wetting of surfaces.
 - 2. Areas of moderate activity, such as installation of plumbing, ductwork, electrical work, must be returned to operating / safe order at the end of each day.
 - 3. Debris below scaffolds including areas of shoring and re-shoring, must be kept sufficiently cleared and consolidated to keep walkways free of tripping hazards at all times. These work areas must also be swept clean immediately after removal of scaffolds, shoring, etc.
 - 4. All swept up debris, waste materials, and packing must be removed and placed in a dumpster by the end of the workday.
 - 5. All stored material must be protected and kept in good order.
 - 6. As portions of the work are completed, all used and excess materials shall be removed promptly.
 - 7. Daily Clean-up and good housekeeping is the responsibility of each contractor individually and will be monitored by the Owner's Construction Representative. If any contractor fails to perform cleaning when directed or does not properly clean within 4 hours of being notified by Owner's Construction Representative, the Owner will hire others and charge the responsible contractor accordingly.
 - 8. Contractors shall promptly comply with requests to organize scattered materials.
 - 9. Daily sweep and weekly damp mop of all work areas.
- F. Each Contractor is responsible for furnishing dumpsters or other such containers as required for collection, storage and legal disposal of all debris and rubbish resultant from their individual construction operations (both demolition and daily construction debris). The Owner's Construction Representative shall direct contractors to locate, maintain and move such containers as necessary and legally dispose of waste as containers are filled. Each contractor shall separate and recycle waste as required by authorities, contract requirements and local regulations / ordinances.
- G. The General Construction Contractor shall vacuum clean areas when ready to receive finish painting, and continue vacuum cleaning, on an as needed basis, until the building(s) is (are) ready for Substantial Completion.
- H. Handle materials in a controlled manner to reduce handling to the extent possible. Do not drop or throw materials from heights.

- I. Schedule cleaning operations so that dust and other containment resulting from cleaning process will not fall on wet, newly painted surfaces.

3.03 FINAL CLEANING

- A. Remove dust, dirt, grease, stains, paint drips and runs, plastic, labels, tape, glue, rope, and other foreign materials from visible interior and exterior surfaces.
- B. Do not move dust from spot to spot. Remove directly from the surface on which it lies by the most effective mean such as appropriately treated dusting cloths or vacuum tools. When doing high cleaning, do not allow dust to fall from high areas onto furniture and equipment below.
- C. Dismantle and remove all temporary structures, scaffolding, fencing, and equipment. Remove waste materials, rubbish, lumber, block, tools, machinery, and surplus materials.
- D. Perform the following prior to final payment:
 1. Broom clean all exterior concrete surfaces and vacuum clean all interior concrete surfaces.
 2. Dust and spot clean painted and vinyl covered walls.
 3. Clean and polish all unpainted metal on doors such as trim, hardware, kickplates and doorknobs.
 4. Vacuum clean carpets and mats.
 5. Vacuum clean acoustic ceilings.
 6. Repair, patch, and touch-up marred surfaces to specified finish and to match adjacent surfaces.
 7. Remove foreign material from exterior masonry.
 8. Replace all broken and scratched glass and mirrors.
 9. Replace all damaged insect screens.
 10. Wash and clean interior and exterior window surfaces. All glass shall be clean and free of dirt, grime, streaks and excessive moisture. Wipe drippings and other marks from windowsills, sashes and woodwork. Do not use windowsills in lieu of ladders.
 11. Polish bright metal by damp wiping and drying with a suitable cloth. If a polished appearance is not thereby produced, apply appropriate metal polish.
 12. Clean and polish all stainless steel surfaces, including control panels supplied under this Contract.
 13. Clean furniture and equipment in accordance with manufacturers instructions.
 14. Clean all paved roads, lots and drives which were paved as work under this Contract and all existing paved surfaces using a mechanical street cleaner.
 15. Repair or repaint damaged pavement markings.
 16. Vacuum and clean with a damp cloth light fixtures, including glass and plastic lenses, ceiling and wall mounted lights, cover panels, side panels, louvers, fixture frames and lamps.
 17. Clean supply vents and exhaust grilles. Clean gutters and downspouts.
 18. Remove all rust spots and stains from new and pre-existing concrete, painted surfaces, and all other surfaces.
 19. Clean and polish all new toilet facilities constructed under this project.
 20. Clean and disinfect all pre-existing toilet facilities that were entered upon and used by the Contractor during the project.
 21. Replace damaged existing toilet fixtures, such as sinks, toilet bowls, urinals, and mirrors, with in-kind units if so directed by the Architect.
 22. Wash all existing floors that were in any way impacted by the construction operations.
 23. Rake clean landscaped surfaces. Final mow all areas grassed and sodded during the work.

24. Inspect interior and exterior surfaces, and all work areas, to verify that the entire work is clean and ready for use by the Owner. The project will not be considered substantially complete until all final cleaning has been performed.
25. Polish all new handrail installed as work of this contract with a commercially available aluminum cleaner recommended by the railing manufacturer.
26. Clean dirt that has accumulated between grating and grating angles/supports.
27. Vacuum the inside of all control panels provided under this Contract after the panel has been wired.
28. Fill in all holes in concrete that remain after temporary handrail is removed. Non-shrink grout shall be used.
29. Elevators: Clean all interior surfaces of the car including hoistway doors and services of the corridors on the side of the elevator. Polish all bright metal surfaces. Clean and spray buff resilient tiles. Dust and damp wipe elevator cab doors, walls and bright work.
30. Magnet sweep all exterior lawn and walkway areas to ensure that stray nails / screws, etc. remain in lawn areas nor on walkways.

3.04 RUBBISH REMOVAL

- A. A. Contractors shall comply with all Local, State and Federal Laws, Codes and Requirements regarding recycling and trash or rubbish removal.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes the following:
 - 1. Starting systems
 - 2. Testing, adjusting, and balancing
 - 3. Updating of manufacturer's operations and maintenance manuals and wiring diagrams
- B. Work of this Section also includes stipulated man-hours that shall be provided by the **Prime Electrical Construction Contractor** for startup participation of equipment and systems.

1.02 STARTING SYSTEMS

- A. The Contractor shall coordinate, schedule, and sequence the start-up of various equipment and systems.
- B. Where the start-up of a system or piece of equipment is dependent upon the start-up of other system(s) or equipment, then the Contractor shall schedule and sequence the start-ups to coincide.
- C. Notify the Architect at least 14 calendar days prior to the start-up of each item or system so that he/she can schedule the startup with the Owner, utilities, and other Prime Contractors.
- D. Where applicable, verify that each piece of equipment or system has been checked for proper:
 - 1. lubrication,
 - 2. drive rotation,
 - 3. belt tension,
 - 4. motor starter heater size,
 - 5. fuse size,
 - 6. water pressures,
 - 7. terminal connections,
 - 8. control sequence,
 - 9. for conditions which may cause damage or delay the start-up procedure.
- E. Verify that the equipment has been installed in accordance with the manufacturer's requirements.
- F. Complete all pre-startup checklists that may be required by the system vendor.
 - 1. In the event that start-up activities are delayed as a result of the Contractor's failure to properly check the completed installation and a manufacturer's representative is on the job site waiting for corrections to be made, then the Architect may, at his/her sole discretion, postpone start-up until such time as the corrections have been made without any extra costs.
 - 2. The Owner may deduct from money due the Contractor the excess cost of engineering associated with having the Architect present during the start-up.
 - 3. The deduction shall be equal to the Architect's effective billing rate times the total number of hours delayed during the start-up activities.
- G. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- H. Verify that wiring and support components for equipment are complete and tested.
- I. Execute start-up under supervision of applicable Contractor's personnel in accordance with manufacturer's instructions.

SECTION 017500 - STARTING AND ADJUSTING **H2M**

- J. The Contractor shall have the job site superintendent present during all start-up activities.
- K. Provide manufacturer's authorized technician at the site when specified and in accordance with the requirements contained in Section 014500 - Quality Control.
- L. Submit manufacturer's start-up reports (MSR's) in accordance with Section 013300.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Submit the following documents to the Architect before Substantial Completion:
 - 1. Project Record Documents as specified in Section 017839.
 - 2. Operations and Maintenance Manuals prepared in accordance with Section 017823 and be updated as a result of start-up activities.
 - 3. Manufacturer's Start-up Reports (MSR's) for all equipment and systems where manufacturer field time is specified.
 - a. Each MSR shall be signed by the field technician(s) who attended the start-up.
 - b. If the manufacturer is taking exception to the installation or if the warranty is voided, he/she shall provide a statement to that effect and provide reasons and justification to explain the company's position.
 - 4. One binder containing original counterparts of all warranties, guarantees, bonds, or affidavits as specified in the Technical Specification Sections. These documents shall contain the original signatures and be placed in a plastic sheet protector, one document per protector.
 - 5. Spare parts checklist itemizing all spare parts furnished under the Contract summarized by Section.
 - 6. Electrical Underwriter's Certificate where the prime construction contract includes electrical construction or where this Contract is for a Prime Electrical Construction Contract.
- B. Submit the following items to the Architect with the final application for payment:
 - 1. Final Application for Payment and continuation (G702 and G703)
 - 2. Contractor's Certified Payrolls
 - 3. OSHA cards for all workers
 - 4. Contractor's Affidavit of Payment of Debts and Claims (G706)
 - 5. Contractor's Affidavit of Release of Liens (G706A)
 - 6. Final list of Subcontractors (G705)
 - 7. Subcontractor's Affidavit of Payment of Debts and Claims (G706) - (for each subcontractor used)
 - 8. Subcontractor's Affidavit of Release of Liens (G706A) - (for each subcontractor used)
 - 9. Consent of Surety to Final Payment (G707)
 - 10. 2 year Maintenance Bond - 100% of contract including change orders
 - 11. Contractors letter guaranteeing workmanship 2 years
 - 12. Product data, Maintenance manuals and Warranty Information
 - 13. As Built Documentation
 - 14. Attic Stock / Spare Parts (provide proof of delivery transmittal signed by owner)
 - 15. Training and Demonstrations (provide sign-in from training session)
 - 16. Asbestos Affidavit and waste manifests
- C. All documents shall be complete, signed, dated, and notarized (where applicable) and be subject to the Architect's acknowledgment of receipt or approval.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies the requirements for Operations and Maintenance Manuals required to be prepared by system suppliers and equipment manufacturers.
- B. The Contractor shall submit Operations and Maintenance Manuals for all equipment.
- C. Where the technical specifications call for the submission of manuals, said manuals shall be prepared in accordance with the requirements contained herein. It being understood that manuals shall be submitted for all equipment even if it is not specifically called out in the specifications.

1.02 MANUAL CONTENTS AND FORMAT

- A. All Operations and Maintenance Manuals shall be as specified hereinafter.
- B. The binder shall be 8 1/2" x 11", metal hinge, vinyl, large capacity by National or Equal. It shall show the name of the manufacturer or supplier and project name on the spine of the binder.
- C. A cover shall be provided showing the names of the Owner, Architect, Contractor, and Manufacturer.
 - 1. It shall show the Contractor's order number and manufacturer's project number.
 - 2. The address of the manufacturer, service station telephone number, project title, contract number, and year shall also be shown.
- D. Provide tabbed color dividers for each separate product and system.
 - 1. The name of the product shall be typed on the tab.
 - 2. A separate tab shall also be provided for information such as troubleshooting instructions, spare parts list, etc.
- E. An index shall be provided in the back of the binder, with a separate tab, providing a quick way for the operator to find key and important topics contained in the manual.
- F. A separate listing for all charts, graphs, tables, figures and shop drawings shall be provided directly following the table of contents.
- G. Each manual shall contain one (1) copy of all shop drawings deemed in compliance with the Contract Documents by the Architect submitted for the equipment or system for which the manual is prepared.
 - 1. Only these shop drawings shall be included in the manual.
 - 2. All shop drawings larger than 8 1/2" x 11" shall be folded and placed in a heavy duty, top loading plastic sheet protector with the title of the drawing showing; one (1) drawing per protector page.
- H. For systems being furnished with control panels, each manual shall contain a catalog cut for every electrical device installed inside the control panel or motor control center.
- I. Where emergency generator(s) are included as work of this Contract, the manufacturer's standard manual will be allowed if the manual clearly shows the instructions for the particular model of generator. Cross out chapters and paragraphs that do not apply to the Owner's generator.
- J. Each manual shall contain the following as a minimum:
 - 1. Table of contents

2. Final version of the warranty statement approved by the Architect
 3. Nameplate data of each component, year of installation, contract number and specification number
 4. Name, address and telephone number of the manufacturer and the manufacturer's local representative(s)
 5. Installation instructions
 6. Operation instructions including adjustments, the interrelation of components and the control sequence describing break-in, start-up, operation and shutdown
 7. Emergency operating instructions and capabilities
 8. Maintenance requirements include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair and reassembly instructions; and alignment, adjusting, balancing, and checking instructions
 9. Troubleshooting guide and corrective maintenance (repair) procedures for all electrical and mechanical equipment. These guides shall list the most frequent and common problems, together with the symptoms, possible causes of the trouble, and remedies
 10. Drawings (pictures or exploded views) which clearly depict and identify each part, suitable for assembly and disassembly of entire system and each component
 11. Wiring and control diagrams, if applicable
 12. Panelboard circuit directories including electrical service characteristics, if applicable
 13. Part list with current prices; ordering information; and recommended quantities of spare parts to be maintained in storage
 14. Charts of valve tag numbers, with location and function of each valve, keyed to the process and instrumentation diagram prepared as part of the Contract Documents
 15. Name, address, and telephone number of nearest parts supply house and nearest authorized repair service center.
 16. List of recommended spare parts and the recommended number of each per unit and per group of units.
- K. All electronic Operations and Maintenance Manuals shall be as specified hereinafter.
1. All files shall be in Adobe PDF format and submitted on compact discs.
 2. Files shall be organized by specification section and then by product.
 3. An electronic index and list of all charts, graphs, tables, figures, and shop drawings shall be included.
 4. All information provided in the paper Operations and Maintenance Manual shall be included in the electronic version.
- L. Submit two (2) copies of a preliminary draft manual at least fourteen (14) calendar days prior to the date set for start-up.
1. The Architect will review the manual for content and compliance with these specifications.
 2. Written comments will be provided, but the manual will not be returned.
 3. One (1) manual will be used at start-up, to record changes that should be made to the final manual.
 4. This copy of the manual will be retained on the site until such time as the final, updated manual is provided.
- M. Two (2) weeks after the date the unit was placed into service and the Owner has gained beneficial use, submit five (5) copies of the final updated Operations and Maintenance Manual. Refer to Section 017500 - Starting and Adjusting for requirements related to updating the manual(s).
- N. Where installation instructions are not included with the manual, they shall be shipped at least ten (10) days prior to the date the equipment is scheduled for installation.

1.03 RETAINAGE

- A. The Architect will retain from payment due the Contractor, for failure to submit manuals as specified, an amount equal to 2% of the scheduled value for the equipment or system for which the manual applies. This Contract requirement only applies when a manual is specified to be provided in the Technical Specifications for a particular system or piece of equipment.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes:
 - 1. Maintenance of documents
 - 2. Recording of record information
 - 3. Submission of record documents

1.02 PLANS AND SPECIFICATIONS FURNISHED TO THE CONTRACTOR

- A. Two (2) complete sets of Contract Documents (plans, specifications and addenda) will be furnished to the Contractor.
- B. Additional sets will be furnished to the Contractor at \$250 per set.

1.03 MAINTENANCE OF DOCUMENTS

- A. The Contractor shall maintain at the site one (1) set of the following: drawings, specifications, addenda, change orders, approved shop drawings, test reports, operations and maintenance manuals, and shop drawing log.
- B. The Contractor shall make these documents available for use by the Owner, Architect, regulatory agencies and other parties designated by the Owner.
- C. Provide a drawing rack for storage of plans.
- D. Maintain these documents in a clean, dry, legible condition throughout the entire contract period.

1.04 RECORDING OF RECORD INFORMATION

- A. Affix a stamp to each Contract Drawing and Shop Drawing reading as follows: "RECORD DOCUMENT" - "NAME OF PROJECT" - "CONTRACTOR NAME" in 2-inch high printed letters. The stamp shall be specifically prepared for this project.
- B. Keep the record documents current as the work progresses. Record information concurrent with construction progress.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Legibly mark the Contract Plans to record actual construction, including, but not limited to the following:
 - 1. All as-built work.
 - 2. All approved field changes and conditions.
 - 3. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - 4. Location of underground conduits, boxes, devices. Wire sizes (AWG) and types installed. Number of active and spare wires in each conduit and conduit size (applicable where work involves electrical construction).
 - 5. Tied-down location of all underground process lines and buried valves.
- E. Shop Drawings: Maintain as record documents. Legibly mark-up to show changes made due to field conditions encountered during construction.

1.05 PROJECT RECORD DOCUMENTS

- A. Maintain a complete and accurate log of control and survey work as it progresses.

1.06 SUBMITTAL OF RECORD DOCUMENTS

- A. At Substantial Completion, the Contractor shall deliver one (1) preliminary record set of as-built documents to the Architect with all changes conspicuously ballooned or otherwise emphasized.
- B. The work will not be considered substantially complete until such time as the preliminary record documents are delivered and acceptable to the Architect. Mark this set "Preliminary Record Drawings".
- C. Prior to Final Completion, the Contractor shall conform the preliminary record drawings to the comments made by the Architect and then provide the Owner a complete reproducible set of as-built drawings on mylar (or mylar sepia) and one set of blue line prints.
- D. As-built drawings shall be the same size as the Contract Drawings, with 1/2-inch margins space on three sides and a 2-inch margin on the left side for binding.
- E. Each drawing shall bear in the title box the words "FINAL RECORD DRAWINGS" and the name of the Contractor in heavy black lettering 1/2 inch high and be certified as complete and accurate.
- F. As a convenience, Architect will make available to the Contractor mylar sepias or electronic media of the Contract Drawings for the sole purpose of the Contractor preparing as-built drawings.
- G. Electronic media made available is without guarantee of compatibility with the Contractor's software or hardware.
 - 1. If the Contractor wishes to take advantage of this offer, the Contractor will be required to execute an indemnification and hold harmless agreement with the Architect.
 - 2. Pay the Architect .
 - 3. Electronic media will be provided free of charge on disc in a zipped format.
 - 4. Electronic media shall be returned to the Architect upon acceptance of the as-built drawings by the Owner.

1.07 RELATED DOCUMENTS

- A. Provide certificate of release of liens if requested by the Architect.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The Section includes the requirements for delivering spare parts specified to be furnished under the provisions of the Contract Documents.

1.02 QUALITY ASSURANCE

- A. Spare parts shall be delivered as complete assemblies direct from the manufacturer such that the part is fully functional and ready to be installed.

1.03 DELIVERY, STORAGE AND HANDLING OF SPARE PARTS

- A. Comply with the requirements of Section 016500 for packing, delivery, storage and handling requirements for all parts delivered to the site of the work.
- B. All spare parts required to be furnished under a Section of the Specifications shall be packaged in one separate box, crate or container with the words "SPARE PARTS" lettered on all sides of the container.
- C. The equipment name or system name for which the spare parts are being provided shall also be lettered on the container.
- D. A separate packing list for the spare parts shall be included in the container.
- E. The Contractor shall store all spare parts indoors immediately upon delivery of the spare parts to the site. Spare parts will not be accepted by the Owner/Architect if the spare parts have been stored outdoors for more than 8 hours upon delivery to the site.
- F. The storage location shall be secure.

1.04 TURN OVER OF SPARE PARTS

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work of this Section includes the requirements for demonstrating and training of installed systems, equipment, and products.
- B. Manufacturer field services and the credit for unused service time is also included herein.

1.02 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual specification sections require field services to be provided, said services shall be provided by qualified, authorized and factory trained representative(s) of the manufacturer (supplier).
- B. Field services shall generally consist of:
 - 1. installation supervision,
 - 2. verify terms of the manufacturer's warranty,
 - 3. equipment and system calibration,
 - 4. startup supervision,
 - 5. and operation and maintenance instructions to the Owner's employees.
- C. Such services do not include service time to correct a factory fault, correct problems resulting from a factory wiring or control logic error, or errors caused by poor or improper installation by the Contractor.
- D. Sale representatives are not acceptable.
- E. The time specified to be provided under the specification sections shall be exclusive of travel time to and from the facility or site. For the purposes of this Contract, one (1) day shall be defined as eight (8) hours exclusive of breaks or mealtime.
- F. The times specified to be provided by the manufacturer does not relieve the manufacturer from providing sufficient service time to place the equipment or systems into satisfactory operation and to obtain the specified performance. The manufacturer shall provide, as a minimum, the times specified in the Specification Sections.

1.03 SUBMITTALS

- A. The Contractor shall prepare a list of all manufacturer specified field time required by the technical specifications. Compile this summary listing and submit it to the Architect for review in accordance with the requirements contained in Section 013300.
- B. Manufacturer's Startup Reports

1.04 QUALITY CONTROL

- A. The Contractor shall adhere to all instructions provided by the manufacturer's authorized representative.
- B. All verbal instructions necessary to satisfy performance of the equipment or the system shall be immediately provided by the Contractor. The manufacturer shall document all verbal orders in writing at a time suitable to the Contractor.

- C. All written instructions provided in operation, maintenance, and installation guides and manuals, provided by the manufacturer of such equipment and or system, shall be complied with by the Contractor.
- D. The Contractor shall comply with all manufacturer requirements such that written or implied warranties remain in full force during the time period so specified elsewhere in the technical specifications.
- E. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Actions and/or non performance by the Contractor that may void manufacturer warranties shall not constitute a release of the specified warranty, and all warranty claims made by the Owner shall be paid for by the Contractor as if the manufacturer's warranty was still in effect.

1.05 SCHEDULING - FIELD SERVICES

- A. The Contractor shall arrange field service on dates acceptable to the Owner and Architect.
- B. The service visits shall be scheduled at least 2 weeks in advance so that the Owner and Architect can adequately staff the date.
- C. Operator training will not be allowed until such time as the Manufacturer's Operation and Maintenance Manuals have been supplied and approved by the Architect.
 - 1. The field service technician shall review the contents of the manual with designated employees of the Owner.
 - 2. Field services will not be deemed provided until the MSR is provided.

1.06 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel prior to date of Substantial Completion.
- B. Utilize manufacturer's and vendor's Operation and Maintenance Manuals as basis for instruction. Review contents of the manual with the Owner's personnel in detail to explain all aspects of operation and maintenance.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of the equipment or of the system.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- E. The Contractor shall arrange to have the manufacturer's Operation and Maintenance Manuals updated with information that has been added during start-up activities.
- F. The final manual shall contain the most recent information and reflect all operational and maintenance aspects of the final installed and functioning system or equipment component of the system.
- G. Any changes to control panel wiring diagrams or interconnection wiring schematics shall be made and new prints provided as an update to previously approved manuals.
- H. Manufacturer field time shall be as specified in individual Sections of the Technical Specifications.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.
 - 4. Recovery of Refrigerant materials.
- B. Related Requirements:
 - 1. Section 011100 - SUMMARY OF WORK for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 311000 - SITE CLEARING for site clearing and removal of above- and below-grade improvements.

1.03 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: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.05 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.
 - 6. Review procedures for turning over salvaged materials to the Owner and protected off-site storage of materials to be reused in the work of the project.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting the public, pedestrian access and circulation areas and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Inventory: Submit a list of items to be removed, salvaged and delivered to Owner prior to start of demolition.
- E. Pre-demolition Photographs and/or Video: Show existing conditions of adjoining existing construction and site conditions, including finish surfaces that could potentially be construed as having been damaged by Demolition activities. Submit two copies prior to commencing Demolition work.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.07 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.08 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.09 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use and is included in this Division of the specifications. Examine report and / or the appropriate specification section to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- 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.
 - 2. Provide a Fire Watch or other method acceptable to the authority having jurisdiction should the existing fire protection facilities have to be shut down during the work.
 - 3. Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to Architect.

1.10 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.
- 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

2.01 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

- 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 perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- 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.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011100 - SUMMARY OF WORK.
- B. Existing Services/Systems to be removed, relocated, or abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies. Provide 5 days notice to the Architect prior to any utility shut-downs.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap, plug or reconnect remaining piping with same or compatible piping material.
 - b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - c. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug or reconnect remaining ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 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 Section 015000 - 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. Maintain existing required widths of egress pathways throughout.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 - TEMPORARY FACILITIES AND CONTROLS.
- 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.

3.04 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 fire watch and 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. 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 cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 1 inch (25 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. 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.

3.06 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 in an EPA-approved landfill.
 - 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 and legally dispose of them.

3.07 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.

3.08 SELECTIVE DEMOLITION SCHEDULE

- A. Remove, store, relocate, salvage and protect the following materials and equipment:
 - 1. Existing Items to Be Removed: Items indicated on contract drawings and items listed in technical specifications sections.
 - 2. Existing Items to Be Removed, relocated and/or Salvaged: Items required to be removed, relocated salvaged and/or stored to complete the work as indicated or called for in these construction documents.
- B. Existing Items to Remain: to complete and conform to the work of the project shall be as indicated on the contract drawings and items listed in the technical specification sections.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Broad Scope: Asbestos containing materials (ACM) have been identified at the project site. Samples of various suspect materials have been collected and analyzed; additional samples may be required as existing materials are removed or revealed during the course of work. The scope of work and procedures outlined herein shall be followed by a New York State Department of Labor (NYS DOL) certified asbestos abatement contractor.
- B. Related Sections:
 - 1. Section 022600 - HAZARDOUS MATERIALS ASSESSMENT.
- C. SCOPE OF WORK
 - 1. Removal of the following items described in the asbestos survey as positive for asbestos, in accordance with NYSDOL Industrial Code Rule (ICR) 56:
 - a. Exterior, Roof – Flashing on Plumbing Vents.
 - b. Interior, Bathrooms – Bathroom Tile Wall Mastic.
 - c. Refer to construction drawings.
 - d. Please see drawings H-100 and H-101 in this project related to Asbestos Abatement.
 - 2. Asbestos Containing materials must be removed only by a New York State Department of Labor (NYS DOL) licensed asbestos abatement contractor (herein referred to as the "Contractor").
 - 3. The Contractor shall be aware of all conditions of the Project and is responsible for field verifying quantities and locations of all ACM to be removed from the building prior to submission of any bid. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work. The quantities presented in this Specification are approximate and should not be used solely as the basis for any bid. In the event that suspect materials not included in this Specification are encountered while the work is in progress, such material shall be tested for asbestos content or assumed positive for asbestos content, and removed in accordance with the procedures herein. Any discovery of new ACM shall not delay the progress of the Work. Payment for any additional work shall be considered on a case-by-case basis by the Engineer and Owner.
 - 4. All Work shall be performed in strict accordance with the Contract Documents and all applicable codes, rules, and regulations. Where conflicts occur between the Contract Documents and applicable codes, rules, and regulations, the more stringent shall apply.
 - 5. The Contractor's industrial hygiene practices during asbestos abatement will be monitored by the Owner's representative. The Contractor shall be responsible for monitoring his own construction safety work practices for compliance with the OSHA regulations.

1.02 CODES, PERMITS AND COMPLIANCE

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of workers, authorized visitors to the site, persons, and property adjacent to the Work.
- B. Perform asbestos related Work in accordance with New York State Industrial Code Rule 56, 40 CFR 61, and 29 CFR 1926, as specified herein. Where more stringent requirements are specified, adhere to the more stringent requirements.
- C. State Licenses: The Contractor must maintain current licenses pursuant to New York State Department of Labor and Department of Environmental Conservation for all Work related to this Project, including the removal, handling, transport, and disposal of asbestos containing materials.

SECTION 028200 - ASBESTOS REMEDIATION H2M

1. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in, or supervise Work on any asbestos Project have a valid NYS asbestos handling certificate pursuant to Industrial Code Rule 56.
 2. The Contractor shall comply fully with the variances secured from regulatory agencies in the performance of the Work. The Contractor shall also be responsible for paying and complying with any additional variances. Should the Contractor choose to apply for any variance, approval from the Engineer is first required. In the event that the Contractor chooses to use more than one NYS Applicable Variance in the same Work Area simultaneously, the Contractor is responsible for complying with all conditions of each variance and any New York State Department of Labor (NYS DOL) interpretations concerning the use of these variances together.
- D. Agency Notifications: The Contractor shall prepare written notification to EPA Region 2, and to the New York State Department of Labor (NYS DOL) at least 10 days prior to commencement of Work, when applicable. The Contractor shall be responsible for use and payment of any notifications required for performance of the Work.
- E. It is the sole responsibility of the Contractor to determine what, if any patents are applicable to the Project. The Contractor shall pay all royalties and/or license fees. He/She shall defend all suits or claims for infringement of any patent rights and save the Owner, Architect, Engineer, and Construction Manager harmless from loss, including attorney's fees, on account thereof.
- F. Before commencement of Work, the Contractor shall review and adhere to the Contract Documents. Failure to adhere to the Contract Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.03 APPLICABLE STANDARDS AND REGULATIONS

- A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:
- B. Federal Regulations:
1. 29 CFR 1910.1001, "Asbestos" (OSHA)
 2. 29 CFR 1910.1200, "Hazard Communication" (OSHA)
 3. 29 CFR 1910.134, "Respiratory Protection" (OSHA)
 4. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
 5. 29 CFR 1926, "Construction Industry" (OSHA)
 6. 29 CFR 1926.1101, "Asbestos, Tremolite, Anthophyllite, and Actinolite" (OSHA)
 7. 29 CFR 1926.2, "Variances from safety and health standards" (OSHA)
 8. 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)
 9. 29 CFR 1926.1200 "Confined Spaces in Construction" (OSHA)
 10. 40 CFR 61, Subpart A, "General Provisions" (EPA)
 11. 40 CFR 61, Subpart M, "National Emission Standard for Asbestos" (EPA)
 12. 49 CFR 171-172, Transportation Standards (DOT)
 13. 40 CFR Part 763, "Asbestos Hazard Emergency Response Act" (AHERA)
- C. New York State Regulations:
1. 12 NYCRR, Part 56, "Asbestos", Industrial Code Rule 56 (DOL)
 2. 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC)
 3. 10 NYCRR, Part 73, "Asbestos Safety Program Requirements" (DOH)
 4. New York State Department of Health (NYSDOH) Training Requirements
- D. Standards and Guidance Documents:
1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection

2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems
3. EPA 560/585-024, Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)
4. EPA 530-SW-85-007, Asbestos Waste Management Guidance

1.04 AUTHORITY TO STOP WORK

- A. The Owner shall have the authority to stop the abatement work at any time a determination is made that conditions are not within Specification and applicable regulations. The stoppage of work shall continue until conditions have been corrected to the satisfaction of the Owner. Standby time to resolve the problems shall be at the contractor's expense.

1.05 SUBMITTALS

- A. Pre-contract Submittals. After bids are opened, the apparent low bidder shall submit the following documentation, in accordance with the project deadlines outlined in the Contract Documents. Failure to submit all required documentation truthfully or in a timely manner may be cause for rejection of the bid.
 1. Contractor license issued by New York State Department of Labor.
 2. A list of Projects 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 firm's name, contact persons, address, and phone number.
 3. A standard operating procedures manual describing Work practices and procedures, equipment, type of decontamination facilities, respiratory program, special removal techniques, etc.
 4. Citations/Violations/Legal Proceedings: Submit a notarized statement describing:
 - a. Any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous abatement contracts. Briefly describe the circumstances citing the Project and involved persons and agencies as well as the outcome of any actions.
 - b. Any litigation or arbitration proceedings arising out of performance on past Projects.
 - c. Any liquidated damages assessed within the last 2 years.
 5. Preliminary Schedule: Provide an estimate of manpower to be utilized and the time required for completion of each major Work Area. Include estimated size and number of crews and work shifts.
- B. Pre-Work Submittals. The Contractor shall submit 3 copies of the documents listed below, in accordance with the project deadlines outlined in the Contract Documents:
 1. Progress Schedule:
 - a. Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
 - b. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each Work Area, building, or phase.
 2. Notifications: As required by Federal, State and local regulatory agencies together with proof of transmittal (i.e. certified mail return receipt).
 3. Permits: As required by State and local regulations, including arrangements for storage, transportation, and disposal of contaminated material.
 4. Abatement Work Plan: Provide plans which clearly indicate the following:
 - a. All Work Areas/containments numbered sequentially.
 - b. Locations and types of all decontamination enclosures.
 - c. Entrances and exits to the Work Areas/containments.
 - d. Type of abatement activity/technique for each Work Area/containment.
 - e. Number and location of negative air units and exhaust.
 - f. Proposed location and construction of storage facilities and field office.

- g. Location of water and electrical connections to building services.
 - 5. Subcontractor List: List of all subcontractors to be used on the Project (i.e. Waste Hauler).
 - 6. Material Safety Data Sheets (MSDS): Copies of MSDS for each chemical or material used for the Project (encapsulant, surfactant, mastic remover, etc.).
 - 7. Laboratory: Submit the NYS Department of Health ELAP certification for the laboratory that will be analyzing the OSHA personnel air samples.
- C. Project Close-out Submittal. Submit the following at the closeout of the Project:
- 1. Copies of all waste disposal manifests, seals, and disposal logs.
 - 2. OSHA compliance air monitoring records conducted during the Work.
 - 3. Daily progress log.
 - 4. Entry and exit log.
 - 5. A list of each Worker used in the performance of the Project, including name, social security number, and New York State Department of Labor (NYS DOL) certification number.

1.06 HEALTH & SAFETY

- A. Worker Protection: The Contractor shall comply with OSHA and provide and maintain all safety measures necessary to properly protect all individuals that enter the work area.
- B. Emergency Actions: In an emergency affecting the safety of life, the work, or adjoining property, the Contractor shall immediately act in such a manner to prevent such threatened loss or injury.
- C. Fire Protection, And Emergency Egress: The Contractor shall be responsible to the security and safeguarding of all areas turned over by the Owner to the Contractor. The Contractor shall designate to his workers and other building occupants the means of egress in case of emergency.
- D. The Contractor shall establish emergency and fire exits from the work area. First aid kit, two (2) full sets of protective clothing and respirators shall be provided for use by qualified emergency personnel in the clean room of the decontamination facility.
- E. Contractor shall provide fire watch and logbook throughout the entire term of the project, to protect against fire and unauthorized entry into and around the work area. Any intrusion or incident shall be documented in the logbook. Fire watch personnel shall be present during off-hours shift such as night shift, weekends and holidays when abatement work is not in progress. Fire watch shall be a certified asbestos handler by New York State Department of Labor (NYS DOL).

1.07 PRE-CONSTRUCTION CONFERENCE

- A. Prior to start of preparatory Work under this Contract, and in accordance with the deadlines outlined in the Contract Documents, the Contractor shall attend a pre-construction conference attended by Owner, Facility Personnel, and Engineer, if requested.
- B. Agenda for this conference shall include but not necessarily be limited to:
 - 1. Contractor's scope of Work, Work plan, and schedule to include number of Workers and shifts.
 - 2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
 - 3. Owner & Engineer's duties, functions, and authority.
 - 4. Contractor's Work procedures including:
 - a. Methods of job site preparation and removal methods.
 - b. Respiratory protection.
 - c. Disposal procedures.

- d. Cleanup procedures.
 - e. Fire exits and emergency procedures.
- 5. Contractor's plan for twenty-four (24) hour project security both for prevention of theft and for barring entry of unauthorized personnel into Work Areas.
- 6. Temporary utilities.
- 7. Handling of furniture and other moveable objects.
- 8. Storage of removed asbestos containing materials.
- 9. Waste disposal requirements and procedures.
- C. In conjunction with the conference, if requested, the Contractor shall accompany the Owner and/or Engineer on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall Work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.08 PROJECT MONITORING, AIR SAMPLING, AND INSPECTIONS

- A. The Owner shall engage the services of an Environmental Consultant (the Consultant) or Engineer who shall serve as the Owner's Representative in regard to the performance of the asbestos abatement Project and provide direction as required throughout the entire abatement period.
- B. The Contractor is required to ensure cooperation of its personnel with the Consultant/Engineer for the air sampling and project monitoring functions described below. The Contractor shall comply with all direction given by the Consultant/Engineer during the course of the Project.
- C. The Consultant/Engineer shall provide the following administrative services:
 - 1. Review and approve or disapprove all submittals, shop drawings, schedules, and samples.
 - 2. Assure that all notifications to governmental agencies by the Contractor are submitted in a timely manner and are correct in content.
 - 3. Review and approve the Contractor's OSHA compliance testing laboratory.
- D. The Consultant/Engineer shall provide abatement project air sampling and analysis as required by applicable regulations (New York State and/or AHERA). Sampling will include background, pre-abatement, during-abatement and clearance sampling.
 - 1. Unless otherwise required by applicable regulations, the Consultant shall have samples analyzed by Phase Contrast Microscopy (PCM) using NIOSH Method 7400. Results shall be available within 24 hours of completion of sampling.
 - 2. If the air sampling during abatement reveals airborne fiber levels at or above 0.01 fibers/cc or the background level (whichever is greater) outside the Work Area, then the Owner shall issue an immediate Stop Work order. The Contractor shall then inspect the barriers for leakage and HEPA vacuum and/or wet clean the surface outside the Work Area. The Contractor shall bear the burden of any and all costs incurred by this delay.
 - 3. Final air clearance sampling will be conducted by Transmission Electron Microscopy (TEM) in accordance with 40 CFR Part 763 (AHERA), as applicable.

1.09 CONTRACTOR AIR SAMPLING

- A. In addition to the requirements of OSHA 1926.1101, the Contractor shall be required to perform personal air monitoring every Work shift in each Work Area during which abatement activities occur in order to determine that appropriate respiratory protection is being utilized (OSHA Monitoring).
- B. The Contractor shall conduct air sampling that is representative of both the 8-hour time weighted average and 30-minute short-term exposures to indicate compliance with the permissible exposure and excursion limits.

- C. The Contractor's laboratory analysis of air samples shall be conducted by an New York State DOH ELAP approved laboratory.

1.10 WORK SUPERVISION

- A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
 - 1. The Project Supervisor shall hold New York State certification as an Asbestos Supervisor.
 - 2. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.1101 and shall have a minimum of one year experience as a supervisor.
 - 3. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.
- B. If the Project Supervisor is not on-site, all Work shall be stopped. The Project Supervisor shall remain on-site whenever asbestos removal is being performed. The Project Supervisor cannot be removed from the Project without the written consent of the Owner and the Engineer.
- C. The Project Supervisor shall maintain the Project Log Book required by New York State Department of Labor and Section 2.03 of the specifications and the Waste Disposal Log required by Section 4.04 of the specifications.
- D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Asbestos Project Monitor.

1.11 DELIVERY AND STORAGE

- A. Deliver non-contaminated materials to the job site in original packages with containers bearing manufacturer's name and label.
- B. Store all materials at the job site in a suitable and designated area.
 - 1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
 - 2. Protect materials from unintended contamination.
- C. Remove damaged or deteriorated materials from the job site. Materials contaminated with asbestos shall be disposed of as asbestos debris as herein specified.

1.12 TEMPORARY UTILITIES

- A. Shut down and lock out all electrical power to the asbestos Work Areas.
- B. Provide temporary 120-208 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the asbestos Work Area.
 - 1. Where available, obtain from Owner's existing electrical system. Otherwise provide power from other sources (i.e. generator).
 - 2. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
 - 3. Provide adequate "weatherproof" receptacles, to incorporate use by the APM for air sampling equipment.
 - 4. All power to the Work Area shall be brought in from outside the area through GFCI's at the source.
- C. Provide temporary lighting with "weatherproof" fixtures for all Work Areas including decontamination chambers.

SECTION 028200 - ASBESTOS REMEDIATION H2M

1. The entire Work Area shall be kept illuminated at all times work is in progress.
 2. Provide lighting adequate for the purposes of performing required inspections.
- D. All temporary devices and wiring used in the Work Area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.
- E. Utilize domestic water service, if available, from Owner's existing system. Provide hot water heaters with sufficient capacity to meet Project demands.

PART 2 - PRODUCTS

2.01 PROTECTIVE CLOTHING

- A. Provide personnel utilized during the Project with disposable protective whole body clothing, head coverings, gloves and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber for comfort, but shall not be used alone. Make sleeves secure at the wrists and make foot coverings secure at the ankles by the use of tape, or provide disposable coverings with elastic wrists or tops.
- B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.

2.02 DISPOSAL BAGS, DRUMS, AND CONTAINERS

- A. Provide 6 mil polyethylene disposal bags printed with asbestos caution labels. Bags shall be imprinted with U.S. Department of Transportation required markings.
- B. If the asbestos waste has the potential to damage or puncture the disposal bags, burlap sacks shall be utilized as a liner inside the polyethylene disposal bags to prevent puncture or damage to the disposal bags. In addition, 30 or 55 gallon capacity fiber or metal drums capable of being sealed air and water tight may also be used. Affix asbestos caution labels on lids and at one-third points around drum circumference to assure ready identification.
- C. Containers and bags must be labeled with the names of the waste generator and the location at which the waste was generated in accordance with 40 CFR Part 61 NESHAPS.
- D. Labeled ACM waste containers or bags shall not be used for non-ACM waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as ACM waste.

2.03 HEPA VACUUM EQUIPMENT

- A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Absolute (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.
- B. Provide tools and specialized equipment including scraping nozzles with integral vacuum hoods connected to a HEPA vacuum with flexible hose.

2.04 POWER TOOLS

- A. Any power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Should the area beyond the Work Area(s) become contaminated with asbestos containing materials or elevated fiber levels, immediately stop Work and institute emergency procedures. Contaminated non-Work Areas shall be isolated and decontaminated in accordance with procedures established for asbestos removal. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.
- B. New York State (NYS) DOL certificates shall be on site prior to admittance of any Contractor's employees to the asbestos Work Area.
- C. Perform all asbestos removal Work using wet removal procedures. Dry removal procedures are not permitted.
- D. The following documents shall be posted at the site at an easily accessible location:
 - 1. Company Asbestos Abatement license.
 - 2. Worker's asbestos handling certificates (copies are acceptable provided Workers have original certificates in their possession).
 - 3. Project specifications.
 - 4. Project drawings.
 - 5. Notifications and variances.
 - 6. Applicable regulations.
 - 7. Material Safety Data Sheets.
 - 8. Abatement Work plan.
 - 9. List of emergency telephone numbers.
 - 10. Waste Disposal Log.
- E. The Work Area must be vacated by building occupants prior to decontamination enclosure construction and Work Area preparation.

3.02 PERSONNEL DECONTAMINATION ENCLOSURE

- A. Full (five room) Decontamination Facility: The Contractor shall provide a full decontamination enclosure system for large asbestos projects in accordance with OSHA Standard 29 CFR 1926.1101 and 12NYCRR Part 56 (ICR 56).
- B. Remote Decontamination Facility: The Contractor shall provide a remote personnel decontamination enclosure system for small asbestos projects, asbestos projects that utilize multiple tents, and exterior asbestos roof projects in accordance with OSHA Standard 29 CFR 1926.1101 and 12NYCRR Part 56 (ICR 56).
- C. Decontamination Enclosure System Utilities: Lighting, heat, and electricity shall be provided as necessary by the Contractor.

3.03 WASTE DECONTAMINATION ENCLOSURE

- A. Waste/Equipment Decontamination Enclosure System: This system is located adjacent to the work area and personnel decontamination system. If the decontamination chamber is accessible to the public it shall be fully framed and sheathed to prevent unauthorized entry. A remote decontamination unit may be used that complies with subpart 56-9 of NYS Industrial Code Rule 56 of Title 12, section 30 of the Labor Law. This remote enclosure system must be on the property and stationary, within 50 feet of the building.

- B. Where only one egress from the Work Area exists, the holding area of the waste decontamination enclosure system may branch off from the personnel decontamination enclosure equipment room, which then serves as the waste wash room.
- C. The waste wash room water shall be drained, collected, and filtered as specified in 12NYCRR Part 56 (ICR 56).
- D. In small asbestos projects where only one egress from the Work Area exists, the shower room may be used as a waste washroom. In this instance, the clean room shall not be used for waste storage, but shall be used for waste transfer to carts, which shall immediately be removed from this enclosure.

3.04 WORK AREA ENTRY AND EXIT PROCEDURES

- A. Personnel Entrance and Decontamination Procedures for Gross Removal Operations utilizing full decontamination facility, the following entry/exit procedures shall be used for gross removal using full containment:
 - 1. All workers and authorized visitors shall enter the work area through the worker decontamination enclosure system.
 - 2. All individuals who enter the work area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall identify fully the facility, agents, contractor(s), the project, each work area and worker respiratory protection employed. The site supervisor shall be responsible for the maintenance of the log during the abatement activity.
 - 3. Each worker or authorized visitor shall, upon entering the job site, remove street clothes in the clean room and put on a clean respirator (with new filters, if appropriate) and clean protective clothing before entering the work area through the shower room and equipment room.
 - 4. Each worker or authorized visitor shall, each time he/she leaves the work area: remove gross contamination from clothing before leaving the work area; proceed to the equipment room and remove all clothing except the respirator; still wearing the respirator, proceed to the shower room; clean the outside of the respirator with soap and water while showering; remove filters, wet them, and dispose of them in the container provided for that purpose; wash and rinse the inside of the respirator; and thoroughly shampoo and wash himself/herself.
 - 5. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately. Disposable clothing of the type worn inside the work area is not permitted outside the work area.
- B. Personnel Entrance and Decontamination Procedures for Removal Operations utilizing remote decontamination facility: The following entry/exit procedures shall be used for removal work areas.
 - 1. All individuals who enter the Work Area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall identify fully the facility, agents, contractor(s), the project, each Work Area, and worker respiratory protection employed. The job supervisor shall be responsible for the maintenance of the log during the abatement activity.
 - 2. Each worker shall remove street clothes in the clean room; wear two disposable suits, including gloves, hoods and non-skid footwear; and put on a clean respirator (with new filters) before entering the work area.
 - 3. Each worker shall, before leaving the work area or tent, shall clean the outside of the respirators and outer protective clothing by wet cleaning and/or HEPA vacuuming. The outer disposable suit shall be removed in the work area and the worker shall then proceed

to the shower room. The inner disposable suit and respirator shall be wet wiped and HEPA vacuumed thoroughly before removing and prior to aggressive shower.

4. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately.

3.05 WORK AREA PREPARATION

- A. Work Area preparation shall be performed in accordance with 12NYCRR Part 56 (ICR 56), the Contract Documents and the approved Asbestos Work Plan.
- B. Temporary lighting within the work area and decontamination system shall be provided as required to achieve minimum illumination levels.
- C. Unless otherwise specified for removal, the Contractor shall either protect all fiberglass insulation on piping, ductwork, tanks, etc. in the Work Area using two layers of six mil polyethylene or remove the insulation as asbestos containing waste. If the Contractor elects to remove the fiberglass insulation, he/she shall be responsible for reinsulation, if reinsulation of removed ACM is part of the Contract or Project.
- D. Emergency exits. Emergency exits and routes shall be established and clearly marked with florescent paint or other effective designations to permit easy location from anywhere within the work area. Emergency exits shall be secured to prevent access from uncontaminated areas and yet permit emergency exiting. Exits shall be checked daily against exterior blockage or impediments to exiting.
- E. Remove all items attached to or in contact with ACM only after the Work Area enclosure is in place. HEPA vacuum and wet wipe with amended water all removed items prior to their removal from the Work Area and before the start of asbestos removal operations.
- F. If, required, suspended ceiling tiles shall only be removed after Work Area preparation is complete. Non-contaminated ceiling tiles shall be HEPA vacuumed and removed from the Work Area before asbestos removals begin. Contaminated ceiling tiles shall be disposed of as asbestos waste.
- G. For tent enclosures: the Contractor shall use negative pressure ventilation equipment to continuously exhaust the enclosed area. A minimum of two (2) volume changes per hour is required. All required air monitoring must be successfully completed before the tent/barrier is collapsed.

3.06 NEGATIVE AIR PRESSURE FILTRATION SYSTEM

- A. Provide a portable asbestos filtration system that develops a minimum pressure differential of negative 0.02 in. of water column within all full enclosure areas relative to adjacent unsealed areas and that provides a minimum of 4 air changes per hour in the Work Area during abatement.
- B. The system shall include a series of pre-filters and filters to provide High Efficiency Particulate Air (HEPA) filtration of particles down to 0.3 microns at 100% efficiency and below 0.3 microns at 99.9% efficiency. Provide sufficient replacement filters to replace pre-filters every 2 hours, secondary pre-filters every 24 hours, and primary HEPA filters every 600 hours of operation.
- C. At no time will the unit exhaust indoors, within 50 feet of a receptor, including but not limited to windows and doors, or adversely affect the air intake of the building.

- D. The Contractor shall provide either a manometer or a photohelic style negative air pressure gauge with chart recorder to measure and record negative pressure differential across the Work Area barriers without interruption 24 hours per day as directed by the Environmental Consultant.
- E. There shall be at least a 12-hour settling period after the Work Area is fully prepared and the negative filtration units have been started to ensure integrity of the barriers. Unless otherwise specified in the variance(s) utilized by the contractor.

3.07 REMOVAL OF ASBESTOS CONTAINING MATERIALS

- A. Asbestos-containing materials shall be removed in accordance with 12NYCRR Part 56 (ICR 56), the Contract Documents and the approved Asbestos Work Plan.
- B. Sufficiently wet asbestos materials with a low pressure, airless fine spray of surfactant to ensure full penetration prior to material removal. Re-wet material that does not display evidence of saturation.
- C. One Worker shall continuously apply amended water while ACM is being remove
- D. Perform cutting, drilling, abrading, or any penetration or disturbance of asbestos containing material in a manner to minimize the dispersal of asbestos fibers into the air. Use equipment and methods specifically designed to limit generation of airborne asbestos particles. All power operated tools used shall be provided with HEPA equipped filtered local exhaust ventilation.
- E. Power or pressure washers will not be allowed to be used for asbestos removal or clean-up procedures.

3.08 ACM WASTE CONTAINERIZING, DECONTAMINATION AND LOAD OUT PROCEDURES

- A. Packaging of ACM shall conform to OSHA Standard 29 CFR 1926.1101, DOT 49 CFR 171, 172, and 173, and EPA Standard 40 CFR Part 61 and the requirements as herein specified. Materials to be transported through a non-Work area building space shall be placed in hard wall shipping containers for handling.
- B. 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.
- C. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
- D. 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.

3.09 WORK AREA CLEANING PROCEDURES

- A. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, decontamination procedures shall be followed as specified in ICR 56, unless otherwise stated in the variance(s) utilized by the Contractor.
- B. Following each decontamination procedure (i.e., first, second, and third cleanings) the APM shall inspect the Work Area for effectiveness of the cleanings. If necessary, additional cleaning shall be performed by the Contractor as directed by the APM.

- C. As a result of any air sampling results that indicate high fiber levels, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.

3.10 TENT ENCLOSURES

- A. Tent enclosures may only be used in areas specifically permitted by New York State (NYS) Code Rule 56 or a Project specific variance issued by the New York State (NYS).
- B. The Contractor shall restrict access to the immediate area where tent removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- C. Remote personnel and waste decontamination enclosures shall be constructed. Configuration shall be as required by Project size.
- D. During removal activity, a HEPA vacuum or small capacity negative pressure filtration unit shall be used to provide a negative air pressure inside the tent. A minimum of six air changes per hour is required.
- E. Workers shall wear two disposable suits for all phases of Work. Workers exiting the tent shall HEPA vacuum the outer suit, enter the airlock, remove the outer suit and then place it back into the Work Area. A clean second suit shall be donned before exiting the airlock and proceeding to the decontamination enclosure or another tent.
- F. ACM removal shall follow procedures defined in Article 3.07.
- G. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed before being passed into the airlock for double- bagging. The bags or containers shall then be transported to the decontamination enclosure and then bagged for a third time and transported to the waste storage container. All transportation of waste bags and containers outside the Work Area shall be in watertight carts.
- H. The APM shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.

3.11 GLOVEBAG REMOVAL

- A. Glovebag removals may only be used as specifically permitted by New York State (NYS) Code Rule 56 , Applicable Variance 108 (AV 108) Glovebag Operations, or a Project specific variance issued by the New York State (NYS) Department of Labor. Glovebags may only be used on piping.
- B. As specified in applicable regulations and variances, glovebag removals are only permitted to be conducted within tent enclosures complying with these specifications. Removal and disposals must also be conducted in conformance with all Project variance conditions.
- C. The Contractor shall restrict access to the immediate area where tent/glovebag removal procedures are taking place using barrier tape and/or construction barriers. Caution signs shall be posted.
- D. Remote personnel and waste decontamination enclosures shall be constructed. Configuration shall be as required by Project size.
- E. The glovebags shall be smoke tested by the APM before removal operations commence. Glovebags that do not pass the smoke test shall be resealed and then retested.

- F. After glovebag removals are complete, tent decontamination procedures shall be followed.

3.12 RESTORATION OF UTILITIES, FIRESTOPPING, AND FINISHES

- A. After final clearance, remove locks and restore electrical and HVAC systems. All temporary power shall be disconnected, power lockouts removed and power restored. All temporary plumbing shall be removed.
- B. Finishes damaged by asbestos abatement activities including, but not limited to, plaster/paint damage due to duct tape and spray adhesives, and floor tile lifted due to wet or humid conditions, shall be restored prior to final payment, unless the damaged surfaces are to be replaced during renovation activities.
1. Finishes unable to be restored shall be replaced under this Contract.
 2. All foam and expandable foam products and materials used to seal Work Area openings shall be completely removed upon completion of abatement activities.
- C. All penetrations (including, but not limited to, pipes, ducts, etc.) through fire rated construction shall be firestopped using materials and systems tested in accordance with ASTM E814 on Projects where re-insulation is part of the required work.

3.13 ASBESTOS WASTE

- A. Applicable Regulations: All asbestos waste shall be stored, transported and disposed of in accordance with the following regulations as a minimum:
1. NYS DEC 6 NYCRRNYRCC part 360 and 364.
 2. US EPA NESHAPS 40 CFR 61.
 3. US EPA Asbestos Waste Management Guidance EPA/530-SW85.
- B. Waste Storage Containers.
1. As work progresses, remove sealed and labeled bags of ACM from the Work area and place in a lockable trailer, dumpster, or other container approved for storage or transport of asbestos waste. Open containers will not be permitted on-site (i.e. open dumpster with canvas cover, etc.).
 2. The container interior shall be plasticized and sealed with a minimum of two (2) layers of 6 mil polyethylene.
 3. While on-site, the container shall be labeled with EPA Danger signage:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD**

4. The danger sign legend, text size, style and arrangement shall conform to the requirements of EPA Standard 40 CFR Part 61.149 (d) (1).
5. The New York State Department of Environmental Conservation Asbestos Hauler's Permit number shall be stenciled on both sides and back of the container.
6. Once the container is loaded at the site, the door(s) will be locked at all times.
7. Before the container is removed from the Project Site for transportation to the Disposal Site, the door(s) shall be locked. The locks shall be removed at the Disposal Site by the operator of the Disposal Facility.
8. The Owner may initiate random checks at the Disposal Site to insure that the procedures outlined herein are complied with.

3.14 DISPOSAL AND TRANSPORTATION OF ASBESTOS-CONTAMINATED WASTES

- A. Sealed and labeled disposal bags or waste wrapped in two layers of plastic sheeting sealed airtight shall be used to transport asbestos-contaminated waste to the landfill. Procedures for hauling and disposal shall comply with 40 CFR, Part 61, 49 CFR, Part 171 and 172, and other applicable state, regional, and local government regulations.
 - 1. An asbestos waste shipment record or waste manifest shall accompany asbestos waste, which is transported to a disposal site.
 - 2. The waste manifest shall be completed by the Contractor.
 - 3. The waste manifest shall have the appropriate signatures of the APM, the Contractor, and the Hauler representatives prior to any waste being removed from the site.
 - 4. Copies of the completed waste manifest shall be retained by APM and the Contractor and shall remain on site for inspection. The Contractor shall forward originals of the waste manifest, which include final sign-off by the disposal facility, to Consultant/Engineer within 14 days of the waste container being removed from the site. Failure to do so may result in payment being withheld from the Contractor.

3.15 DISPOSAL SITE

- A. The Contractor's Hauler and Disposal Site shall be approved by the Owner.
- B. The Contractor shall have the Hauler provide the estimated date and time of arrival at the Disposal Site.
- C. Unless specifically approved by the Owner, the Contractor shall not permit any off-site transfers of the waste or allow the waste to be transported or combined with any other off-site asbestos material. The Hauler must travel directly to the disposal site without unauthorized stops.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Liquid-applied self-leveling floor underlayment.
 - 1. Cementitious type.

1.02 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.
- B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2018.
- C. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2021.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.
- E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2022.
- F. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.03 SUBMITTALS

- A. See Section 013300 - SUBMITTALS, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Instructions.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section, and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F (41 degrees C).

1.06 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F (10 degrees C) 24 hours before, during and 72 hours after installation of underlayment.

- C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cementitious Underlayment:
1. ARDEX Engineered Cements; ARDEX V 1200 with ARDEX P51 Primer: www.ardexamericas.com/#sle.
 2. Custom Building Products; CL-150 Self-Leveling Underlayment: www.custombuildingproducts.com/#sle.
 3. Maxxon Corporation; Level-One EZ: www.maxxon.com/#sle.
 4. MAPEI Corp.; Novoplan 2 Plus (standard set) or Ultraplan 1 Plus (rapid set) with Primer T: www.mapei.com
 5. UZIN, a division of UFLOOR Systems Inc; UZIN PE 260 primer with UZIN NC 170 LevelStar: www.ufloorsystems.com/#sle.
 6. W. R. Meadows, Inc; Floor-Top STG: www.wrmeadows.com/#sle.

2.02 MATERIALS

- A. Cast Underlayments, General:
1. Comply with applicable code for combustibility or flame spread requirements.
 2. Provide certificate of compliance from authority having jurisdiction indicating approval of underlayment materials in the required fire rated assembly.
- B. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
1. Compressive Strength: Minimum 5000 pounds per square inch (34.5 MPa) after 28 days, tested per ASTM C109/C109M.
 2. Flexural Strength: Minimum 1000 psi (6.9 MPa) after 28 days, tested per ASTM C348.
 3. Density: 125 pounds per cubic foot (2002 kg/cu m), nominal.
 4. Final Set Time: 1-1/2 to 2 hours, maximum.
 5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch (89 mm).
 6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- C. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch (3 mm) in size and acceptable to underlayment manufacturer.
- D. Reinforcement: Galvanized metal lath complying with recommendations of underlayment manufacturer for specific project circumstances.
- E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- F. Primer: Manufacturer's recommended type.
- G. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.03 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.

- B. Add aggregate for areas where thickness will exceed 1/2 inch (12.7 mm). Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
- C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

3.02 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
 - 1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of Insert value in 24 hours.
- C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.
- D. Concrete: Prepare surfaces according to ICRI 310.2R, CSP 6 (medium scarification)
- E. Wood: Install metal lath for reinforcement of underlayment.
- F. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- G. Vacuum clean surfaces.
- H. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- I. Close floor openings.

3.03 APPLICATION

- A. Install underlayment in accordance with manufacturer's instructions.
- B. Pump or pour material onto substrate. Do not retemper or add water.
 - 1. Pump, move, and screed while the material is still highly flowable.
 - 2. Be careful not to create cold joints.
 - 3. Wear spiked shoes while working in the wet material to avoid leaving marks.
- C. Place to indicated thickness, with top surface level to 1/16 inch in 10 ft (1:2000).

- D. For final thickness over 1-1/2 inches (38 mm), place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.
- E. Place before partition installation.
- F. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.
- G. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.04 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.

3.05 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field inspection and testing, as specified in Section 014000 - Quality Requirements.
- B. Placed Material: Agency will inspect and test for compliance with specification requirements.

3.06 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Cast stone trim.
 - a. Window sills.
 - b. Coping.
 - c. Wall caps.
 - d. Splashblocks.

1.03 PERFORMANCE REQUIREMENTS

- A. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- B. General Performance: Design cast stone anchors and anchoring systems in accordance with ASTM C1364.
- C. Delegated Engineering Responsibility: Employ a delegated engineering professional to provide engineering work for work of this Section to comply with the design intent expressed in the Contract Documents.
 - 1. Cast stone anchoring shall be engineered to withstand structural design loads within the limits and under the conditions required without material failure according to the following:
 - a. Applicable local and state building codes.
 - b. Authorities having jurisdiction.
 - 2. Comprehensively analyze location, type, magnitude and direction of loads imposed.
 - 3. Prepare engineering calculations, shop drawings and other submittals and affix design professional engineer's seal according to respective jurisdictional licensing regulations.
- D. Structural Performance: Provide cladding system capable of withstanding the effects of gravity loads and the following loads and stresses within the limits and under conditions indicated:
 - 1. Wind Loads:
 - a. Uniform Pressure: As indicated on the drawings.
 - b. Basic Wind Speed: 130 mph.
 - c. Importance Factor: 1.15.
 - d. Exposure Category: B.
 - 2. Seismic Loads: Provide anchoring capable of withstanding the effects of seismic loading using the design parameters as indicated on the drawings.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
 - 1. Include building elevations showing layout of units and locations of joints and anchors.
- C. Samples for Initial Selection: For colored mortar.

- D. Samples for Verification:
 - 1. For each color and texture of cast stone required, 10 inches square in size.
 - 2. For each trim shape required, 10 inches in length.
 - 3. For colored mortar, make samples using the same sand and mortar ingredients to be used on the project.
- E. Full Size samples: For each color texture and shape of cast stone unit required:
 - 1. Make available for Architect's review at the Project Site.
 - 2. Make Samples from materials to be used on Project.
 - 3. Approved Samples may be installed in the Work.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
 - 1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C1364.
- B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C1364, including test for resistance to freezing and thawing.
 - 1. Provide test reports based on testing within previous two years.
- C. Delegated Professional Engineer's Qualifications demonstrating compliance with specifications.

1.06 DELEGATED DESIGN SUBMITTALS

- A. Delegated Design Submittal: For cast stone systems indicated to comply with the performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Include pertinent diagrams and design calculations.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute.
- B. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.
- C. Installer's Qualifications: Cast Stone work shall be installed by a firm normally in the business of installing work of the type indicated for a minimum of ten years.
- D. Delegated Engineering Professional Qualifications: Professional Engineer legally authorized to practice in the jurisdiction where the Project is located and experienced in providing engineering services of kind indicated that has resulted in work similar to this project and who has a record of successful in-service performance.
- E. Testing Agency Qualifications: Qualified in accordance with ASTM E329 for testing indicated.
- F. Mock-ups: Build mock-ups to verify selections made under Sample submittals and to demonstrate the aesthetic effects and set quality standards for materials and execution.

1.08 PREINSTALLATION MEETINGS

- A. Preliminary Conference: Before starting cast stone removal, conduct conference at Project site.

1. Meet with the Architect, Construction Manager and Manufacturer's Representative
 - a. Review methods and procedures related to demolition and fabrication.
 - b. Review requirements for salvaging material.
- B. Pre-installation Conference: Conduct conference at Project site.
 1. Meet with the Architect, Construction Manager, Installer and Manufacturer's Representative, testing and inspecting agency and other installers whose work interfaces with or affects cast stone installation.
 - a. Review methods and procedures related to installation.
 - b. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - c. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery of cast stone to avoid delaying the Work and to minimize the need for on-site storage.
- B. Pack, handle, and ship cast stone units in suitable packs or pallets.
 1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
 2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store mortar aggregates where grading and other required characteristics can be maintained without contamination.

1.10 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530/530.1/ERTA/ASCE 6/TMS 602.
 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530/530.1/ERTA/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.01 CAST STONE UNITS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Corinthian Cast Stone, Inc.
 2. David Kucera, Inc. (DKI)
 3. Great Lakes Cast Stone, Inc.
 4. Stone Legends, Dallas, Texas.

- B. Provide cast stone units complying with ASTM C1364 using wet-cast method.
 - 1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C666/C666M, Procedure A, as modified by ASTM C1364.
- C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
 - 1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
 - 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 - 3. Provide drips on projecting elements unless otherwise indicated.
- D. Fabrication Tolerances:
 - 1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch (3 mm).
 - 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater, but in no case by more than 1/4 inch (6 mm).
 - 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater.
 - 4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch (3 mm) on formed surfaces of units and 3/8 inch (10 mm) on unformed surfaces.
- E. Cure units as follows:
 - 1. Cure units in enclosed, moist curing room at 95 to 100 percent relative humidity and temperature of 100 degrees F for 12 hours or 70 degrees F for 16 hours.
 - 2. Keep units damp and continue curing to comply with one of the following:
 - a. No fewer than five days at mean daily temperature of 70 degrees F or above.
 - b. No fewer than six days at mean daily temperature of 60 degrees F or above.
- F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- G. Colors and Textures: As selected by Architect from manufacturer's full range.
- H. Compressive Strength - ASTM C1194: 6,500 psi minimum for products at 28 days.
- I. Absorption - ASTM C1195: 6.0% maximum by the cold water method.
- J. Air Content – ASTM C173/C173M or ASTM C231, for wet cast product shall be 4.0-8.0% for units exposed to freeze-thaw environments. Air entrainment is not required for Vibrant Dry Tamp (VDT) products.
- K. Freeze-thaw – ASTM C1364: The CPWL shall be less than 5.0% after 300 cycles of freezing and thawing.
- L. Linear Drying Shrinkage – ASTM C426: Test and report in accordance with ASTM C1364.

2.02 MORTAR MATERIALS

- A. Comply with requirements in Section 042200 - Concrete Unit Masonry and for mortar mixes.
- B. Provide mortar materials that comply with Section .
- C. Portland cement: ASTM C150/C150M, Type I or Type III may be used for cold weather construction. Provide natural color or white cement as required to produce mortar color selected by the Architect.

- D. Hydrated Lime: ASTM C207, Type S.
- E. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.
- F. Aggregate for Mortar: ASTM C144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
 - 3. White mortar Aggregates: Natural white sand or crushed white stone.
 - 4. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- G. Water: Potable.

2.03 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M, or ASTM A666.
- B. Dowels: 1/2 inch diameter round bars fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276/A276M or ASTM A666.
- C. 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 cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc

2.04 MORTAR MIXES

- A. Comply with requirements in Section 042200 - CONCRETE UNIT MASONRY for mortar mixes.
- B. Do not use admixtures including pigments, air entraining agents, accelerators, retarders, water repellant agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime mortar unless otherwise noted.
- C. Comply with ASTM C270, Proportion Specification.
 - 1. For setting mortar, use Type N.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - 1. Mix to match existing.
 - 2. Application: Use colored-aggregate mortar for exposed mortar joints.

2.05 JOINT PROTECTIVE SYSTEM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide joint protective system consisting of a molded cap or fillet with a splined tang for anchoring sealant filled mortar joints as manufactured by Weathercap, Inc. or an approved equal product.
- B. Materials:
 - 1. Tee Caps, Corners/ Fillets:
 - a. Use size of strips as recommended by the manufacturer.
 - b. Strips should be of sufficient size to cover the joint width, plus a percentage allowance for anticipated joint movement, plus 1/4".
 - 2. Sealant: As recommended by protective joint system manufacturer and as specified in Section 079200 - JOINT SEALANTS.

2.06 SOURCE QUALITY CONTROL

- A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C1364.
 - 1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION**3.01 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 - 2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.
 - 3. Coordinate installation of cast stone units with installation of flashing specified in other sections and as indicated on the drawings.
- B. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
- C. Set units in full bed of mortar with full head joints unless otherwise indicated.
 - 1. Set units with joints to match existing unless otherwise indicated.
 - 2. Build anchors and ties into mortar joints as units are set.
 - 3. Fill dowel holes and anchor slots with mortar.
 - 4. Fill collar joints solid as units are set
 - 5. Build concealed flashing into mortar joints as units are set. Provide pan type flashing at sill conditions.
 - 6. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
 - 7. Keep joints at shelf angles open to receive sealant. Maintain weep openings.
- D. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint width.

- E. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.
- F. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control and pressure-relieving joints; and at locations indicated.
- G. For Sealant filled joints:
 - 1. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.
 - 2. Keep joints free of mortar and other rigid materials. Remove temporary shims and spacers from joints after anchors and supports are secured in place and cast stone units are anchored. Do not begin sealant installation until temporary shims and spacers are removed.
 - a. Form open joint of width indicated, but not less than 3/8 inch (10 mm).
 - 3. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
 - 4. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 - JOINT SEALANTS
- H. Provide joint protection system where indicated.

3.03 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.04 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
 - 1. Remove mortar fins and smears before tooling joints.
 - 2. Remove excess sealant immediately, including spills, smears and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning prior to proceeding with cleaning of cast stone.

3. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water as recommended by the manufacturer.
4. Clean cast stone with proprietary acidic cleaner applied and removed in accordance with the manufacturer's written instructions.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Pitched roof rafters.
 - 2. Stud wall framing.
 - 3. Joist framing.
 - 4. Parapet framing and bracing.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 3. The design of the cold-formed steel framing shall be the responsibility of the contractor's fabricator. The sizes (depth) of the steel studs shall be as shown on the contract drawings. Unless specifically indicated on the construction documents, it shall be the responsibility of the design engineer to size the spacing and gauge of the element as well as the total depth of the member in the case of header and sill design.
 - 4. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 5. The contractor's fabricator shall provide a full set of engineering calculations as well as a complete set of shop drawings affixed with a New York State Professional Engineer's sign and seal. The design of the cold-formed steel elements shall be in conformance with the information shown on the contract documents and shall be in accordance with the 2020 Building Code of New York State.
- C. Fabrication Drawings:
 - 1. Prior to fabrication submit fabrication and erection drawings for review and approval by the architect/ engineer. Indicate component details, framing for openings, bearing anchorage, temporary bracing, welds or type and location of mechanical fasteners and accessories or items required of other work for complete installations. Included manufacturer's instructions for securing studs to tracks and for other framing connections.
 - 2. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.

- C. 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.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E329 to conduct the testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- 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."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, 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.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. ClarkDietrich Building Systems, LLC.
 - 2. MarinoWARE
 - 3. Architect/ Engineer approved equivalent.

2.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft.

2.03 COLD-FORMED STEEL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: ST33H.
 - 2. Coating: G90 or equivalent.
- C. Steel Sheet for Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: 50, Class 1 or 2.
 - 2. Coating: G90.
- D. All studs and/or joists and accessories shall be the type, size, gage, and spacing shown on the plans. Studs, runners (track) bracing, and bridging shall be manufactured per ASTM C955.
- E. All galvanized studs, joists, and accessories shall be formed from steel that conforms to the requirements of ASTM A653/A653M, as set forth in Section 1.02 of the AISI specification for design of cold-formed steel structural members.
- F. All galvanized studs joists and accessories shall have a minimum G60 coating.
- G. Minimum steel gauges shall be 18 gauge for all structural elements subject to gravity and/or lateral wind forces.
- H. Minimum steel gauge for interior elements subject to partition loadings shall be 20 gauge.
- I. All section properties shall be calculated in accordance with the AISI specification for the design of cold-formed steel structural members (latest edition).
- J. Facing materials may not be substituted for bridging. Horizontal bridging must be installed prior to loading the wall and/or floor/roof joists.
- K. The physical and structural properties published by approved supplier will be accepted; otherwise these properties must be substantiated by calculations for loading stresses and deflections of the designed framing sealed by a professional engineer licensed in the State of New York.
- L. Prior to fabrication submit fabrication and erection drawings for review and approval by the architect/ engineer. Indicate component details, framing for openings, bearing anchorage, temporary bracing, welds or type and location of mechanical fasteners and accessories or items required of other work for complete installations. Included manufacturer's instructions for securing studs to tracks and for other framing connections.

2.04 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.033 inch, 20 gauge.
 - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, un-punched, with un-stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge.
 - 2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ClarkDietrich Building Systems, LLC.
 - b. MarinoWARE
 - c. Steel Network, Inc. (The).
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; un-punched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge.
 - 2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

2.05 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Stud kickers and knee braces.
 - 7. Hole reinforcing plates.
 - 8. Backer plates.

2.06 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.
- G. Column Flange Grip Clips: Pre-manufactured Column/Beam connectors for rapid installation of board type materials to Steel Column and Beam Flanges. ASTM A1003/A1003M Structural Grade 33 (230) Type H, ST33H (ST230H): 33ksi (230MPa) minimum yield strength, 45ksi (310MPa) minimum tensile strength, 27mil minimum thickness (22 gauge, 0.0283" design thickness) with ASTM A653/A653M G60 (Z180) hot dipped galvanized coating. Manufacturer: The Steel Network, Inc. Unit connection box measures 1 inch deep, 2 inches wide and 2 1/2 inches long with a spring clip depth of 2.375 inches and a curved clip spring clearance of .2 inches.
 - 1. Install as indicated on the drawings. Maximum spacing 24 inches on center.

2.07 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M.
- B. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C1107/C1107M, with fluid consistency and 30-minute working time.
- C. Shims: Load bearing, high-density multimonomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.08 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine supporting substrates and abutting structural framing 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.

3.02 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work. Welds may be butt, fillet, spot or groove type. The appropriateness of which shall be determined by and within the design calculations. All welds shall be touched-up using zinc -rich paint to galvanized members and paint similar to that used by the manufacturer for painted members.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

- E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Install insulation, specified in Section 072100 - THERMAL INSULATION in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- J. Wire tying in structural applications is not permitted.

3.04 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 unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches unless indicated otherwise.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb 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.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to infill studs and anchor to building structure.
 - 4. Connect drift clips to cold formed metal framing and anchor to building structure
- E. Install horizontal bridging in wall studs, spaced vertically 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 centers indicated on Shop Drawings.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.05 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. All members shall be checked for proper alignment, bearing, completeness of attachments, proper placement and reinforcing.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Remove and replace work where test results indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.06 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

3.07 TOLERANCES

- A. Vertical alignment (plumbness) of studs shall be within 1/8 inch in 4 feet of the span.
- B. Horizontal alignment (levelness) of walls shall be within 1/8 inch in 4 feet of their respective lengths.
- C. Spacing of studs shall not be more than +1/8 inch from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Treated Wood Members.
 - 2. Fasteners.
 - 3. Wood blocking, cants, and nailers.
 - 4. Wood furring and grounds.

1.03 REFERENCES:

- A. AITC - American Institute of Timber Construction.
- B. APA PRP-108 - Performance Standards and Qualification Policy for Wood Structural Panels (Form E445); 2021.
- C. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions; 2012a (Reapproved 2018).
- D. ASTM D5456 - Standard Specification for Evaluation of Structural Composite Lumber Products; 2021, with Editorial Revision.
- E. AWWA U1 - Use Category System: User Specification for Treated Wood; 2023.
- F. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. PS 1 - Structural Plywood; 2019.
- H. PS 2 - Performance Standard for Wood Structural Panels; 2018.

1.04 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. 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.
 - 3. SPIB: The Southern Pine Inspection Bureau.
 - 4. WCLIB: West Coast Lumber Inspection Bureau.
 - 5. WWPA: Western Wood Products Association.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. 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.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.06 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
 1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Plywood.
 4. Shear panels.
 5. Power-driven fasteners.
 6. Powder-actuated fasteners.
 7. Expansion anchors.
 8. Metal framing anchors.

1.07 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Handle, Transport and Store Plywood Panels in accordance with the APA Storage and Handling recommendations.
- B. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship" for the following:
 1. Dimension lumber framing.
 2. Miscellaneous lumber.

- B. 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. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. 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.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness 15 percent for 2-inch nominal thickness or less, no limit for more than 2-inch nominal thickness unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; UC2 (Interior Construction - Above Ground - Damp) for interior construction not in contact with the ground, Use Category UC3B (Above Ground Exposed) for exterior construction not in contact with the ground, and UC4B (Ground Contact or Fresh Water - Heavy Duty) for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood floor plates that are installed over concrete slabs-on-grade.

2.03 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 E84, 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. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 3. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D6841.
- 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 qualified testing agency. Mark panels on surfaces that will not be exposed in the final construction.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
1. Concealed blocking.
 2. Framing for non-load-bearing exterior walls.
 3. Roof construction.

2.04 DIMENSION LUMBER FRAMING

- A. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
1. Species and Grade: Southern pine; No. 1 grade; SPIB.
 2. Species and Grade: Douglas fir-south; No. 1 grade; WWPA.
 3. Species and Grade: Hem-fir; No. 1 grade; WCLIB or WWPA.

2.05 CONSTRUCTION MOUNTING PANELS

- A. Communications and Electrical Room Mounting Boards: PS 1, APA rated A-D faced plywood or MDF; 3/4 inch thick; flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.06 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. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
1. Hem-fir (north); NLGA.
 2. Mixed southern pine; SPIB.
 3. Hem-fir; WCLIB or WWPA.
 4. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

- C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
 - 1. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 - 2. Eastern softwoods; No. 2 Common grade; NeLMA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.07 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or Type 304 stainless steel.
- B. Power-Driven Fasteners: NES NER-272.
- C. Wood Screws: ASME B16.1.
- D. Lag Bolts: ASME B18.2.1.
- E. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers.
- F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E488/E488M conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

2.08 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES

- A. Surfaces to receive new wood members shall be free of all dirt, debris, and loose materials. Exposed surfaces shall be mechanically scraped if necessary, to remove projections.

- B. Surfaces shall have no free water present in any form (rain, dew, frost, snow or ice).
- C. Contractor is responsible to inspect all exposed surfaces to see that conditions are satisfactory for installation of new work.

3.02 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Place horizontal members flat, crown side up.
- C. Coordinate installation of adjacent construction.
- D. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. 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.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 - 3. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.10.1, "Fastening Schedule," in ICC's "International Building Code" and the 2020 Building Code of New York State".

3.03 WOOD GROUND, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preserved-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.04 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood casings and moldings.
- C. Hardware and attachment accessories.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, installation of associated and adjacent components, and provision of plumbing fixture templates.

1.03 SUBMITTALS

- A. See Section 013300 - SUBMITTALS for submittal procedures.
- B. Product Data:
 - 1. Provide data on fire retardant treatment materials and application instructions.
 - 2. Provide instructions for attachment hardware, finish hardware, and support hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
 - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
 - 3. Include certification program label.
- D. Samples: Submit two samples of finish plywood, 6 x 6 inch (152 x152 mm) in size illustrating wood grain and specified finish.
- E. Samples: Submit two samples of wood trim 6 inch (152 mm) long.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- G. LEED Data Submissions: See Section 018113 - SUSTAINABILITY DESIGN REQUIREMENTS for required submittals.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 - 2. Single Source Responsibility: Provide and install this work from single fabricator.
- B. Quality Certification:
 - 1. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 2. Provide designated labels on shop drawings as required by certification program.
 - 3. Provide designated labels on installed products as required by certification program.
 - 4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.
- C. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, Crown and Miscellaneous Trim: Maple; prepare for paint finish.
 - 2. Door, Glazed Light, and Pocket Door Frames: Clear White Pine; prepare for paint finish.
 - 3. Window Sills: Maple; prepare for paint finish.
 - 4. Loose Shelving: Red Oak plywood; prepare for paint finish.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. Provide sustainably harvested wood, certified or labeled as specified in Section 016100 - FIBER CEMENT SIDING (HARDIE).
- C. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless indicated otherwise, and provided it is clean and free of contamination, identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc. (ALSC).

2.03 LUMBER MATERIALS

- A. Softwood Lumber: Poplar species, Planed, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
 - 1. Grading: In accordance with rules certified by ALSC; www.alsc.org.
- B. Hardwood Lumber: White Oak species, Abrasive Planed, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.04 SHEET MATERIALS

- A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- B. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- C. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

2.05 PLASTIC LAMINATE MATERIALS

- A. Plastic Laminate: NEMA LD 3, HGS; color as selected by Architect; textured, low gloss finish; color and pattern as selected by the Architect manufactured by Formica or approved equal.
- B. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate.
- C. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

2.06 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Concealed Joint Fasteners: Threaded steel.

2.07 ACCESSORIES

- A. Lumber for Shimming and Blocking: Softwood lumber of Cedar or Pine species.
- B. Primer: As specified in Section 099123.
- C. Wood Filler: Solvent base, tinted to match surface finish color.

2.08 HARDWARE

- A. Hardware: Comply with BHMA A156.9.
- B. Standard Shelf, Countertop, and Workstation Brackets:
 - 1. Material: Aluminum.
 - 2. Finish: Brushed; with clear, factory-applied coating.
 - 3. Products:
 - a. A&M Hardware, Inc ; Standard Brackets: <http://www.aandmhardware.com/#sle>.
- C. Americans with Disabilities Act (ADA)-Compliant Vanity and Countertop Brackets:
 - 1. Material: Stainless steel.
 - 2. Finish: Brushed.
 - 3. Products:
 - a. A&M Hardware, Inc ; ADA Vanity Brackets: <http://www.aandmhardware.com/#sle>.
- D. Specialty Shelf Brackets:
 - 1. Material: Steel.
 - 2. Manufacturer's standard, factory-applied, textured powder coat.
 - 3. Color: Black.
 - 4. Products:
 - a. A&M Hardware, Inc; Concealed Flat Brackets: <http://www.aandmhardware.com/#sle>.

2.09 WOOD TREATMENT

- A. Wood Preservative by Pressure Treatment (PT Type): Provide AWPA U1 treatment using waterborne preservative with 0.25 percent retainage.
- B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

- C. Redry wood after pressure treatment to maximum 15 percent moisture content.

2.10 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- C. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
- D. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

2.11 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 12, Polyurethane, Water-based.
 - b. Stain: As selected by Architect.
 - c. Sheen: Flat.
- E. Back prime woodwork items to be field finished, prior to installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.
- C. See Section 061000 - Rough Carpentry for installation of recessed wood blocking.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

- D. Install hardware in accordance with manufacturer's written instructions.

3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coat(s) of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.04 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 099123.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

SECTION 064023 - INTERIOR SILLS AND TRIM **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Plastic-laminate covered sills and trim.
 - 2. Solid-surfacing-material sills and trim.
 - 3. Wood sills and trim
 - 4. Closet and utility shelving.

1.03 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.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Data: For high-pressure decorative laminates and Solid-surfacing materials.
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- D. Samples for Initial Selection:
 - 1. Plastic laminates.
 - 2. Solid-surfacing materials.
 - 3. Hardwood Sill and apron materials.
- E. Samples for Verification:
 - 1. Plastic laminates, 6 by 6 inches, for each type, color, pattern, and surface finish.
 - 2. Solid-surfacing materials, 3 by 3 inches, for each type, color, pattern, and surface finish.
 - 3. Hardwood material, 3 by 3 inches, for each species, cut, and surface finish.
- F. Product Certificates: For each type of product, signed by product manufacturer.

1.05 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.
- B. 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.
- C. 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.

1.06 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.

1.07 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 and relative humidity at occupancy levels during the remainder of the construction period.
- B. 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 (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. 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.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.08 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

2.01 MATERIALS

- A. General: Provide materials that comply with requirements of quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Medium-Density Fiberboard, Particle Board, Hardboard, Softwood Plywood, Veneer Faced Panel Products: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
 - 2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 - 3. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 - 4. Solid Wood: Provide materials that comply with requirements of referenced quality standard for each type of wood and quality grade specified unless otherwise indicated.
 - a. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.
 - b. Wood Moisture Content for Interior Materials: 5 to 10 percent.

- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - a. Formica Corporation.
 - b. Nevamar Company, LLC; Decorative Products Div.
 - c. Wilsonart International; Div. of Premark International, Inc.
 - d. Architect approved equivalent, as selected by Architect.
- D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following - refer to finish schedule for initial selections:
 - a. Avonite, Inc.
 - b. Formica Corporation.
 - c. Nevamar Company, LLC; Decorative Products Div.
 - d. Corian
 - e. Architect approved equivalent.

2.02 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, and Shims: 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. 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):

2.03 FABRICATION, GENERAL

- A. 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.
- B. Complete fabrication, including assembly, finishing, 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. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. 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.
- C. 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

SECTION 064023 - INTERIOR SILLS AND TRIM **H2M**

roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.04 PLASTIC-LAMINATE SILLS AND TRIM

- A. Grade: Custom
- B. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade HGS.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade HGS.
 - 4. Edges: Grade HGS.
- C. Materials for Semi-exposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Match Architect's sample - refer to finish schedule for initial selections.
- E. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.05 SOLID-SURFACING-MATERIAL SILLS AND TRIM

- A. Grade: Premium.
- B. Solid-Surfacing-Material Thickness: 3/4 inch (19 mm).
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
 - 1. As selected by Architect from manufacturer's full range.
- D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
- E. Provide multiple edge thickness as required to produce edge profile indicated on the drawings.

2.06 WOOD SILLS AND TRIM

- A. Grade: Custom.
- B. Wood Species and Cut:
 - 1. Species: Red Oak.
 - 2. Cut: Plain Sliced.
 - 3. Edge profile: Bullnose.
 - 4. Sill Extensions: As indicated on the drawings.
 - 5. Finish: Transsparent Stain in color selected by the Architect with two coats of polyurethane in sheen selected by Architect.
 - 6. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.

SECTION 064023 - INTERIOR SILLS AND TRIM **H2M**

- C. For sills and trim items other than aprons wider than available lumber, use veneered construction. Do not glue for width.

2.07 CLOSET AND UTILITY SHELVING

- A. Grade: Custom.
- B. Shelf Material: 3/4-inch (19-mm) veneer-faced panel product with solid-lumber edge.
- C. Cleats: 3/4-inch (19-mm) solid lumber.
- D. Wood Species: Any closed-grain hardwood.

2.08 SHOP FINISHING

- A. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of sills and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

PART 3 - EXECUTION

3.01 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.

3.02 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 (3 mm in 2400 mm).
- 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 or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

SECTION 064023 - INTERIOR SILLS AND TRIM **H2M**

3.03 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 woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-faced architectural cabinets.
 - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
 - 4. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Initial Selection:
 - 1. Plastic laminates.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer fabricator.
- B. Product Certificates: For each type of product.
 - 1. Composite wood and agrifiber products.
 - 2. High-pressure decorative laminate (HPL).
 - 3. Adhesives.
- C. Woodwork Quality Standard Compliance Certificates: AWI (AWS) Quality Certification Program certificates.

1.05 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 (AWS)'s Quality Certification Program.
- B. Installer Qualifications: Fabricator of products.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.07 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install cabinets 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.
- C. Field Measurements: Where cabinets are 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 cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.08 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.01 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
 - 2. 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.
- B. Grade: Premium
- C. Fabricators: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Tobin Woodworking, Inc., 155-B Allen Boulevard, Farmingdale, N.Y. 11735 (631) 249-1614.

2. MTD Corporation, 41 Otis Street, W. Babylon, N.Y. 11704 (631) 491.3905
www.mtdwoodwork.com.
3. M & D Millwork, LLC, 178 New Highway, Amityville, N.Y. 11701 (631) 608.4444
www.mdmillwork.com.
4. North Shore Custom Woodworking, 16 Clifford Place, East Norwich, N.Y. 11732 (516) 946.9166 www.northshorecustomwoodworking.com.
5. Lifetime Design Group, 162 E. Industry Court, Deer Park, N.Y. 11729 (631) 242.1162
www.lifetimedesigncorp.com.
6. Handcraft Cabinetry Inc., 230 Ferris Avenue, White Plains, N.Y. 10603 (914) 681-9437
mike@handcraftcabinetry.com.

D. Type of Construction: Frameless

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Formica Corporation
 - b. Wilsonart International; Div. of Premark International, Inc.
 - c. Or approved equal.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGL.
2. Vertical Surfaces: Grade HGS.
3. Edges: Grade HGS.
4. Pattern Direction: As indicated.

G. Materials for Semi-exposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
 - b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.

H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from laminate manufacturer's full range in the following categories:
 - a. Wood grains, matte finish.
 - b. Patterns, matte finish.

2.02 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Softwood Plywood: DOC PS 1.

- C. Plywood Panel Material for Curved and Radial type millwork and cabinetry: Bendable Plywood (Curve-Ply, Flexply, Wacky Wood and Wiggle Wood) constructed from Meranti hardwood veneers with all layers running in one direction to enable bending to achieve curving and radial configurations. Material manufactured in the United States and distributed by Packard Forest Products (877) 200-4213 or Architect approved equivalent.A
 - 1. Thicknesses: 9mm.
 - 2. Panel Sizes: 120 inches by 48 inches (Grain in 48 inch direction).
 - 3. Veneer: Plastic Laminate as selected by the Architect..
 - 4. Finish: Covered in Plastic Laminate in Texture, Color and Pattern as selected by the Architect.

2.03 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware" and as indicated on the drawings.
- B. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- C. Shelf Rests: BHMA A156.9, B04013; metal.
- D. 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.
- E. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.04 MISCELLANEOUS MATERIALS

- A. Adhesives: Do not use adhesives that contain urea formaldehyde.
- B. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.05 FABRICATION

- A. Fabricate cabinets to dimensions, profiles, and details indicated.
- B. 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. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. 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 before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, 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.

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.02 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. 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 (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.03 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, 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 cabinets on exposed and semi-exposed surfaces.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Interior standing and running trim.
 - 2. Closet and utility shelving.
 - 3. Wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.03 ACTION SUBMITTALS

- A. Samples for Initial Selection:
- B. Samples for Verification:
 - 1. Lumber for transparent finish, not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

1.04 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For the following:
 - 1. Adhesives.
- B. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.05 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: Certified participant in AWI's Quality Certification Program.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver wood trim until operations that could damage wood trim have been completed in installation areas. If wood trim must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.07 FIELD CONDITIONS

- A. Environmental Limitations for Interior Work: Do not deliver or install interior wood trim until building is enclosed, wet work is complete, and HVAC system is operating and maintaining

temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.08 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood trim can be supported and installed as indicated.

PART 2 - PRODUCTS

2.01 WOOD TRIM, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of wood trim indicated for construction, finishes, installation, and other requirements.
 - 1. Provide certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
 - 2. 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.

2.02 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Grade: Economy.
- B. Wood Species and Cut:
 - 1. Species: Red Oak.
 - 2. Cut: Plain Sliced.
 - 3. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
- C. For trim items other than base wider than available lumber, use veneered construction. Do not glue for width.
 - 1. For veneered base, use hardwood lumber core, glued for width.
- D. For base wider than available lumber, glue for width. Do not use veneered construction.
- E. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.

2.03 CLOSET AND UTILITY SHELVING

- A. Grade: Custom.
- B. Shelf Material: 3/4-inch (19-mm) veneer-faced panel product with solid-lumber edge.
- C. Cleats: 3/4-inch (19-mm) solid lumber.
- D. Wood Species: Match species indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
- E. Closet Rods: Stanley, BB 8182 Series or approved equal, finish as selected by the Architect.
- F. Closet Rod Flange set: Stanley V8600-Heavy Duty or approved equal, finish as selected by the Architect.

2.04 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of wood trim and quality grade specified unless otherwise indicated.
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.
 - 2. Wood Moisture Content for Interior Materials: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of wood trim and quality grade specified unless otherwise indicated.
 - 1. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.05 MISCELLANEOUS MATERIALS

- A. Interior Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber
Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.06 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate wood trim to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Edges of Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).
- C. Back-kerf or groove backs of flat trim members and kerf backs of other wide, flat members except for members with ends exposed in finished work.
- D. Assemble casings in shop except where shipping limitations require field assembly.
- E. Assemble moldings in shop to maximum extent possible. Miter corners in shop and prepare for field assembly with bolted fittings designed to pull connections together.

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Before installation, condition wood trim to average prevailing humidity conditions in installation areas.
- B. Before installing architectural wood trim, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.02 INSTALLATION

- A. Grade: Install wood trim to comply with same grade as item to be installed.
- B. Assemble wood trim and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install wood trim level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut wood trim to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor wood trim to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1. For shop-finished items, use filler matching finish of items being installed.
- 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 (2400 mm) 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 latex sealant, painted to match wall.
 - 2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
 - 3. Install wall railings on indicated metal brackets securely fastened to wall framing.
- G. Refer to Section 099123 - Interior Painting for final finishing of installed wood trim.

3.03 ADJUSTING AND CLEANING

- A. Repair damaged and defective wood trim, where possible, to eliminate functional and visual defects; where not possible to repair, replace wood trim. Adjust joinery for uniform appearance.
- B. Clean wood trim on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Glass-fiber blanket insulation.

1.03 ACTION SUBMITTALS

- A. See Section 013300 - SUBMITTALS, for submittal procedures.
- B. Product Data: For each type of product indicated.
- C. Manufacturer's Certificate: Certify panels will conform to specified performance requirements.

1.04 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.05 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.06 PRE-INSTALLATION MEETING

- A. Pre-Installation Meeting: Convene minimum one week prior to commencing Work of this section. Review installation procedures and coordination required with Related Work and include the following:
 - 1. Participants: Authorized representatives of the Contractor, Architect, Installer, and Manufacturer.
 - 2. Review wall assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
 - 3. Review continuous insulation wall panels installation methods and procedures related to application, including manufacturer's installation guidelines.
 - 4. Review firestopping requirements and weather resistive membrane requirements and placement locations.
 - 5. Review field quality control procedures.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.
- C. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.01 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Johns Manville.
 2. Knauf Insulation.
 3. Owens Corning.
- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 70 percent.
1. Provide a minimum of R-38 above ceilings and R-21 in exterior metal frame walls exclusive of exterior insulated sheathing materials.
- C. Weather / Air Barrier shall be Tyvek Commercial DrainWrap as manufactured by DuPont or approved equal.
1. Install as recommended by the manufacturer to provide a drainage plane behind the exterior siding and finishes.
- D. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- E. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 2. Low Emitting: Insulation tested according to ASTM D5116 and shown to emit less than 0.05-ppm formaldehyde.

2.02 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Ceiling plenums.

- C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
- D. Insulation Fasteners: Lengths of galvanized, 13 gauge, 0.072 inch (1.83 mm) high carbon spring steel with chisel or mitered tips, held in place by tension, length to suit insulation thickness and substrate, capable of securely supporting insulation in place.
- E. Insulation Fasteners: Impaling clip of galvanized steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- F. Wire Mesh: Galvanized steel, hexagonal wire mesh.
- G. Adhesive: Gun grade, interior and exterior, and compatible with insulation and substrates; complies with ASTM C557.
 - 1. Application Temperature: 40 to 100 degrees F (5 to 38 degrees C) at contact surfaces.
 - 2. Volatile Organic Content (VOC): Less than 7 percent by weight.
- H. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.02 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation 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. 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.

3.03 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 48 inches in from exterior walls.

3.04 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
 - 1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04

3.05 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- 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. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 - 5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls: Set units with facing placed toward interior of construction.
 - b. Interior Walls: Set units with facing placed toward areas of high humidity.
- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.06 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

- A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches up either side of partitions.

3.07 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.

2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.08 INSTALLATION OF CURTAIN-WALL INSULATION

- A. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.
 1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
 2. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

3.09 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. 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 retarders.
- C. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.10 CLEANING

- A. Progress Cleaning: Perform cleanup as work progresses in accordance with Section 011400 - WORK RESTRICTIONS and 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 017423 - CLEANING.
- C. Waste Management:
 1. Coordinate recycling of waste materials with Section 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

3.11 PROTECTION

- A. Protect installed insulation and vapor retarders 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

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Ethylene-propylene-diene-monomer (EPDM) roofing system.
 - 2. Roof edge systems.
 - 3. Cover Board.
 - 4. Tapered Roof insulation.
 - 5. Roof Insulation.
 - 6. Fire Thermal Barrier.
 - 7. Vapor retarder.
 - 8. Expansion Joints.

1.03 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.04 SUBSTITUTIONS / OR EQUALS

- A. Substitutions or Equals for the roofing material manufacturer and items listed in this specification shall be submitted in conformance with Division 01 and as otherwise modified by the following:
 - 1. A proposed Substitution/or Equal submission package must be submitted to the Architect no later than ten (10) business days prior to the bid date. Otherwise, any Substitution/or Equal other than the manufacturer specified will not be considered.
 - 2. Submittal to Architect shall include:
 - a. Identification of Project - Project Name;
 - b. Name of Submitting Bidder;
 - c. Telephone and Email address of Submitting Bidder;
 - d. Manufacturer's Name of Proposed or Equal/Substitution;
 - e. Model, line or material type;
 - f. Equivalent line by line item comparison for each item listed in the materials section of this specification, including each of the optional accessories. Note: Each proposed item must have proposed manufacturer and model/product numbers.
 - g. Addresses of two locations within 30 miles of the proposed site, where the proposed Substitution/or Equal manufacturer has installed their similar roofing product and name and telephone number of a contact person to be able to arrange a site visit.
 - h. A copy of the final signed warranty signed and issued by the manufacturer for the two projects provided.
 - 3. Partial and/or Failure to follow any of the procedures outlined in Division 01 or above may subject the entire submission for rejection.
 - 4. Incomplete submissions may not be reviewed.
 - 5. Substitution/ or Equals if found acceptable will be approved via addenda, which will be issued to all bidder's.
 - 6. In order to include an approved Substitution/or Equal in the bid, the bidder must acknowledge on the bidders bid form that the bidder intends to provide the approved Substitution/or Equal and the bidder shall also list the name of the approved Substitution/or Equal manufacturer as well on the bidders bid form. Failure of the bidder to express their

intent to use the approved Substitution/or Equal as part of the bid will exclude the bidder from being able to utilize another Manufacturer from the one specified.

7. If a bidder uses a Substitution/or Equal, the bidder will take responsibility to pay for the re-engineering and coordination of all other items that are to be provided that have been defined in the Contract Documents as additional items to the roofing system, including but not limited to all deck preparation/modifications, additional flashings or modification to existing roof drains.

1.05 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project site.
 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Review the use and staging of hoisting equipment required for the project including safety OSHA regulations pertaining to operation and use of this equipment.
 5. Review Contractor's (and their Subcontractor's) responsibility to comply with OSHA regulations, requirements for provision and implementation of safety equipment and regulations. Additionally, Contractor shall keep on-site at all times a minimum of three complete additional safety units (i.e.: harnesses, rigging gear, hardhats, safety vests, etc.) for use by site visitors requiring access to the work.
 6. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 7. Review structural loading limitations of roof deck during and after roofing.
 8. Review the location of any fresh-air intakes for the building with the building owner which may have to be covered or re-directed to maintain intakes during roofing operations.
 9. Review base flashings, special roofing details, roof drainage, roof penetrations; raising and/or replacement of equipment curbs, disconnection and re-connection of mechanical roof mounted equipment; and condition of other construction that affects roofing system.
 10. Review governing regulations and requirements for insurance and certificates if applicable.
 11. Review temporary protection requirements including but not limited to safety lines, roof barriers, walkway protections as required by OSHA during and after roofing installations.
 12. Review roof installation observations during construction; notifications and repair procedures after roofing installation with the manufacturer's field representative.
 13. Asbestos abatement work coordination.
 14. Debris removal procedures and requirements.

1.06 ACTION SUBMITTALS

- A. Submittals shall be made in accordance with Section 013300 - SUBMITTALS.
- B. Product Data: For each type of product.
- C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
 1. Base flashings and membrane terminations including laps, seam layout, direction of laps and flashing details.
 2. Tapered insulation, including slopes.
 3. Roof plan showing orientation of steel roof deck and orientation of roofing and fastening spacing's and patterns for mechanically fastened roofing.
 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

- D. Samples for Verification: For the following products:
 - 1. Membrane roofing, of color required, 12 inch x 12 inch.
 - 2. Insulation Board - 12" x 12" sample.
 - 3. Cover Board - 12 inch x 12 inch.

E. Manufacturers complete installation Instructions.

F. MSDS Sheets for all materials.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of complying with performance requirements.

C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

E. Sample Warranties: For manufacturer's special warranties.

1.08 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.09 QUALITY ASSURANCE

A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.

B. Single Source Responsibility: Roofing system materials and components shall be supplied and warranted by membrane manufacturer for specified roofing system and specified membrane manufacturer's warranty and shall be in compliance with specified regulatory requirements.

C. Regulatory Requirements for Roof Assembly:

- 1. Comply with Factory Mutual System Approval Guide to provide FMRC-Approved roof assembly meeting Class 1A-120 (FM 4470) requirements for fire resistance and wind uplift in accordance with FM Loss Prevention Data Sheets FM DS 1-28, FM 1-49 and FM DS 1-29.
- 2. Underwriters Laboratories, Inc. (UL): Class A Fire Hazard Classification
- 3. Conform to applicable code(s) for roof assembly fire hazard requirements.
- 4. Conform to loading requirements indicated in ASCE 7 for applicable building location, exposure and use.
- 5. Factory Mutual (FM) 1A-120 Compliance/Roof Assembly.

D. Qualifications.

- 1. Manufacturer: Company specializing in manufacturing the products specified in this section with Ten (10) years documented experience.
- 2. Applicator: Company specializing in performing the work of this section with Five (5) years documented experience. Installer shall be a qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
 - 2. All curable materials must be stored between 60° F and 80°F.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.
- E. Protect adjacent materials and surfaces against damage from roofing work. Do not store materials on previously completed roofing.

1.11 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, edge materials, copings, and other components of roofing system.
 - 2. Warranty Period: Thirty (30) years from date of Substantial Completion with no dollar limitation (NDL) on the cost or quantity of repairs. Pro-rated roofing warranties will not be accepted.
 - 3. The warranty shall include coverage for wind speed with peak gusts of 120 mph measured at 30 feet above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.
 - 4. Warranty shall also provide coverage for roof leakage caused by hail up to and including 2 inch in diameter.
 - 5. Materials and Workmanship for the following items shall be included in the manufacturer's warranty:
 - a. Membranes.
 - b. Flashings, including metal flashings and accessories supplied by roofing membrane manufacturer.
 - c. Insulation.
 - d. Fasteners and adhesives.
 - e. Accessories.
 - f. Roof drains.
 - g. Roof Edge and coping systems.
 - 6. The warranty deliverables shall include the following:

- a. Original of the warranty with original signature of a roofing manufacturer's company official authorized to sign the warranty.
 - b. An additional three copies of the signed warranty noted above.
 - c. Record set of as-built roofing drawings.
 - d. Final Roof Inspection Report by the manufacturer's authorized Field Representative.
- B. Warranty: This project is being constructed in an existing Commercial Building with an EPDM roof having an in-place existing warranty. Contractor will be required to provide a roofing contractor that is approved by the existing roofing manufacturer. Contractor shall maintain and modify existing warranty to include the work required by this project. Contractor shall meet with and provide for all required meetings, and construction inspections by an authorized Field Representative from the Roofing manufacturer issuing and modifying / extending the current warranty. Contractor shall provide to the building owner (with a copy to the Tenant), an original Warranty copy signed by a current authorized representative of the Roofing manufacturer at the completion of the work and prior to final payment claim submittal.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Obtain components including roof insulation for roofing system from manufacturer approved by membrane roofing manufacturer.

2.02 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G154, or ASTM G155.
 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:
1. Corner Uplift Pressure: -38.2lbf/sq. ft.
 2. Perimeter Uplift Pressure: -45.9lbf/sq. ft.
 3. Field-of-Roof Uplift Pressure: -56.2lbf/sq. ft.
- D. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low -slope roof products.
- E. Energy Performance: Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.
- F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.03 EPDM ROOFING

- A. EPDM: ASTM D4637/D4637M, Type II, scrim or fabric internally reinforced, uniform, flexible EPDM sheet.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Elevate; Holcim Solutions and Products US, LLC: Black Rubberguard EPDM
 - b. Carlisle SynTec Incorporated.
 - c. Johns Manville.
 - d. Versico Incorporated.
 - 3. Thickness: 60 mils, nominal.
 - 4. Exposed Face Color: Black.

2.04 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
 - 1. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:

a. Plastic Foam Adhesives:	50 g/L.
b. Gypsum Board and Panel Adhesives:	50 g/L.
c. Multipurpose Construction Adhesives:	70 g/L.
d. Fiberglass Adhesives:	80 g/L.
e. Single-Ply Roof Membrane Adhesives:	250 g/L.
f. Single-Ply Roof Membrane Sealants:	450 g/L.
g. Non-membrane Roof Sealants:	300 g/L.
h. Sealant Primers for Nonporous Substrates:	250 g/L.
i. Sealant Primers for Porous Substrates:	775 g/L.
j. Other Adhesives and Sealants:	250 g/L.
- B. Protection Sheet: Epichlorohydrin or neoprene non reinforced flexible sheet, 55 to 60 mil (1.4 to 1.5mm) thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.
- C. Bonding Adhesive, splice cleaners, splice cement and splice tape: Manufacturer's standard.
- D. Prefabricated Control or Expansion Joint Flashing: Type approved for the total roof system by roofing manufacturer.
- E. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 6 inch (75mm) wide minimum, butyl splice tape with release film.
- F. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.
- G. Molded Pipe Flashings inside and outside corner flashing: as recommended by membrane manufacturer.
- H. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- I. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 inch by 1/8 inch (25mm by 3mm) thick; with anchors.

- J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.05 SUBSTRATE BOARDS / THERMAL BARRIER

- A. Substrate Board / Thermal Barrier: ASTM C1278/C1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, 5/8 inch (16 mm) thick.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Georgia-Pacific; DensDeck Prime Roof Board.
 - b. USG Corporation; Securock Gypsum-Fiber Roof Board.
 - c. Architect approved equivalent.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM 4470, designed for fastening substrate panel to roof deck.

2.06 VAPOR RETARDER

- A. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

2.07 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by EPDM roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated. Minimum LTTR of 30 required.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Elevate; Holcim Solutions and Products US, LLC; Tapered ISO 95+ TM GL Insulation.
 - b. Carlisle Syntec Systems; InsulBase Polyisocyanurate insulation.
 - c. Or approved equal.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated or at least twice the slope of the tapered insulation in the field of the roof areas.

2.08 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- C. Flexible FAST Adhesive: Sure-Seal FAST 100 or 100 LV Adhesive: A low rise two-component spray-applied or extruded bead applied, to approved insulations to compatible substrates (concrete, cellular lightweight insulating concrete, gypsum, cementitious wood fiber, wood or steel) or sooth or gravel surfaced BUR, modified bitumen or cap sheets.

- D. Cover Board: ASTM C1278/C1278M, cellulosic-fiber reinforced, water-resistant gypsum substrate, 5/8 inch.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Georgia-Pacific; DensDeck Prime Roof Board.
 - b. USG Corporation; Securock Gypsum-Fiber Roof Board.
 - c. Securshield HD Plus Coverboard.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 - 2. Verify that perimeter wood blocking, curbs, and nailers are securely anchored to roof deck at roof perimeters, penetrations and terminations in accordance with Factory Mutual 1-49 requirements and that nailers match thicknesses of insulation .
 - 3. Steel Decks: Verify that surface plane flatness and fastening of steel roof deck complies with manufacturer's requirements.
 - 4. Concrete Decks:
 - a. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - b. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 - c. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.03 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.04 SUBSTRATE BOARD / THERMAL BARRIER INSTALLATION

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - 1. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.05 VAPOR-RETARDER INSTALLATION

- A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 inches and 6 inches, respectively. Seal laps by rolling.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.06 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated. Form crickets and saddles as indicated on approved roof installation shop drawings.
- D. Install insulation under area of roofing to achieve required LTTR of 30 minimum. Install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
- G. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- H. Mechanically Fastened Insulation: Install insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
- I. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- J. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten cover boards according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.07 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

- D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.
- E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeters.
- F. Apply roofing with side laps shingled with slope of roof deck where possible.
- G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.
- H. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- I. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal membrane roofing in place with clamping ring.
- J. Adhere protection sheet over membrane roofing at locations indicated.

3.08 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.
- B. Manufacturer's Field Services: The manufacturer's authorized Field Representative and Roofing Quality Control Inspector shall provide the following:
 - 1. Attend and conduct Pre-installation Meeting.
 - 2. Perform preparatory, initial, follow-up and final inspections for roof insulation and roofing system.
 - 3. Prepare and submit inspection reports for each inspection made.
- C. Upon completion of the installation the manufacturer's authorized Field Representative shall conduct an on-site inspection in the presence of the Architect/Engineer to insure that the installation has been installed in accordance with the manufacturer's specifications.
- D. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - 1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
 - 2. Flood each area for 24 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.
- E. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- F. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- G. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.09 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Reglets and counterflashing.
 - 2. Roof flashing.

1.03 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. FM Approvals' Listing: Manufacture and install roof flashing and counterflashing roof flashing and counterflashing that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-120. Identify materials with FM Approvals' markings.
- C. SPRI Wind Design Standard: Manufacture and install copings, scuppers, roof edges, flashings and other roof metal work tested according to SPRI ES-1 and capable of resisting the required design pressure:
- D. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.04 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 roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:
 - 1. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
 - 2. Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
 - 3. Details of termination points and assemblies, including fixed points.
 - 4. Details of special conditions.
- C. Samples for Verification: For reglets and counterflashing made from 12-inch (300-mm) lengths of full-size components including fasteners, cover joints, accessories, and attachments.

1.05 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer regularly engaged in the manufacturing of counterflashing of similar type to that specified for a minimum of Ten (10) years.
- B. Installer's Qualifications:
 - 1. Installer regularly engaged in installation of counterflashing of similar type to that specified for a minimum of Five (5) years.
 - 2. Use persons trained for installation of counterflashing following manufacturer's installation instructions.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 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 specialties installation.

1.08 WARRANTY

- A. Provide a fully executed manufacturer's warranty as specified for the Flashing System, when installed per manufacturer's instructions. Product Warranty Period:
 - 1. Five-year workmanship warranty covering replacement or repair of products that are defective in material or workmanship.
- B. Special Warranty on Painted Finishes: Manufacturer's standard form in which 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 D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 EXPOSED METALS

- A. Aluminum Sheet: ASTM B209/B209M, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 - 1. Surface: Smooth, flat finish.
 - 2. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Three-Coat Fluoropolymer: AAMA 2605. System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.

- b. Concealed Surface: 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 (0.013 mm).

2.02 CONCEALED METALS

- A. Aluminum Sheet: ASTM B209/B209M, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

2.03 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. 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 316 stainless steel.
- C. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.04 REGLETS AND COUNTERFLASHINGS

- A. Manufacturers: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Metal-Era, Inc.: Counter-Flash 2-piece counterflashing / reglet. (Basis of Design)
 - a. CFR2-400R, 4 inch face height.
 - 2. MM Systems Corporation.
 - 3. Cheney Flashing Company.
 - 4. Hickman Company, W. P.
- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
 - 1. Formed Aluminum: 0.050 inch thick
 - 2. Corners: Factory mitered and continuously welded.
 - 3. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
 - 4. Lengths: 12 foot long.
 - 5. Aluminum Finish: Three-coat fluoropolymer, Kynar 500.
 - a. Color: As selected by Architect from manufacturer's full range.
- C. Counterflashing: Manufactured units of heights to overlap top edges of base flashings by 4 inches to snap into reglets and compress against base flashings with 3 inch long prenotched joint laps fabricated from the following exposed metal:
 - 1. Formed Aluminum: 0.050 inch thick.
 - 2. Lengths: 12 foot long with 3 inch prenotched lap joints and slotted fastener holes 12 inches on center.
 - 3. Aluminum Finish: Three-coat fluoropolymer, Kynar 500.
 - a. Color: As selected by Architect from manufacturer's full range.
- D. Accessories:

1. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.05 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 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 not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 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 are in suitable condition for roofing specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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, 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 watertight 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.
- 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 shown 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 will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints with sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.03 REGLET AND COUNTERFLASHING INSTALLATION

- A. General: Coordinate installation of reglets and counterflashing with installation of base flashings.
- B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashing overlap 4 inches over top edge of base flashings.
- C. Counterflashing: Insert counterflashing into reglets or other indicated receivers; ensure that counterflashing overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant. Fit counterflashing tightly to base flashings.

3.04 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

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.
 - 3. Penetrations in smoke barriers.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1.04 FIELD QUALITY CONTROL

- A. Section 014500 - QUALITY CONTROL: Field inspection and testing.
 - 1. Inspect the installed firestopping after application and curing for integrity, prior to its concealment.
 - 2. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings.
 - 3. Re-inspect the installed firestopping for integrity of fire protection, after installation of subsequent work.
 - 4. Provide written inspection report and certification to the Architect, indicating installation meets or exceeds requirements of contract documents.

1.05 FIELD MOCK-UP

- A. Field Mock-up Installations: Prior to installing firestopping, erect mock-up installations for each type firestop system indicated in the Firestop Schedule to verify selections made and to establish standard of quality and performance by which the firestopping work will be judged by the Owner or Owner's Representative. Obtain acceptance of mock-up installations by the Owner or Owner's Representative before start of firestopping installation. Provide at least 72 hours notice to Owner or Owner's Representative prior to inspection.

1.06 INFORMATIONAL SUBMITTALS

- A. See Section 013300 - SUBMITTALS, for Submittal Procedures.
- B. Qualification Data: For qualified Installer.
- C. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 - 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) FM Global in its "Building Materials Approval Guide."
 - 2) UL Fire Resistance Directory.
 - (a) Firestop Devices (XHJI)
 - (b) Fire Resistance ratings (BXRH)
 - (c) Through Penetration Firestop Systems (XHEZ)
 - (d) Fill Voids or Cavity Materials (XHHW)
 - (e) Forming Materials (XHKU)
- D. Preinstallation Conference: Conduct conference at Project site.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilation's or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

- A. Do not use materials that contain flammable solvents.
- B. Scheduling:
 - 1. Schedule installation of Cast in Place firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
 - 2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather Conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.
- F. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- G. Coordinate sizing of sleeves, openings, core-drilled holes, Cast-in place sleeves or cut openings to accommodate penetration firestopping.
- H. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- I. Coordinate sizing of sleeves, openings, core-drilled holes, Cast-in place sleeves or cut openings to accommodate penetration firestopping.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hilti, Inc.
 - 2. 3M Fire Protection Products.
 - 3. STI Firestop
 - 4. Tremco, Inc.; Tremco Fire Protection Systems Group.
 - 5. USG Corporation.

2.02 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 E814 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. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. Horizontal assemblies include floors floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
 - 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 - 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.
- E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- G. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or 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.
- I. Identification Labels:
 - 1. Furnished by fire stopping manufacturer of suitable material for permanent field identification of through-penetration firestops.
 - 2. Identify the following:
 - a. Warning Wording
 - b. Manufacturer Name.

- c. Product Catalog number.
 - d. Tested System number.
 - e. F-rating.
 - f. T-rating, if applicable.
 - g. Firestop Contractor name.
 - h. Firestop Contractor Contact Number.
 - i. Firestop Inspection Date & Inspector Initials.
3. Field fabricated labels are not acceptable.

2.03 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic 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.
1. Hilti CP 680 M or P Cast-In-Place Firestop Device
 - a. Add Aerator adapter when used in conjunction with aerator ("sovent") system.
 2. Hilti CP 681 Tub Box Kit for use with tub installations.
 3. Specified Technologies Inc. CID cast-in devices.
- B. Sealants, caulking materials or foams for use with non-combustible items including items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
1. Hilti FS-ONE MAX Intumescent Firestop Sealant.
 2. Hilti CP 604 Self-leveling Firestop Sealant.
 3. Hilti CP 620 Fire Foam
 4. Hilti CP 606 Flexible Firestop Sealant
 5. Hilti CP 601s Elastomeric Firestop Sealant.
- C. Sealants, caulking materials or foams for use with sheet metal ducts the following products are acceptable:
1. Hilti FS-ONE MAX Intumescent Firestop Sealant.
 2. Hilti CP 606 Flexible Firestop Sealant
 3. Hilti CP 601s Elastomeric Firestop Sealant:
- D. Firestop Joint Spray: sprayable fire-rated mastic for deck flutes and joints where greater movement is expected:
1. Hilti Firestop Joint Spray CFS-SP-WB.
- E. Mineral Wool plugs for filling steel deck flute and wall gap openings:
1. Hilti CP 777 Friction Fit sized and cut to depth for deck flute openings as recommended by the manufacturer.
 2. Hilti CP 767 continuous filler strip for filling continuous gaps at top of walls.
- F. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
1. Hilti FS-ONE MAX Intumescent Firestop Sealant
 2. Hilti CP 620 Fire Foam
 3. Hilti CP 601s Elastomeric Firestop Sealant
 4. Hilti CP 606 Flexible Firestop Sealant.
- G. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

- H. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
 - 1. Hilti FS-ONE MAX Intumescent Firestop Sealant
 - 2. Hilti CP 604 Self-leveling Firestop Sealant
- I. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with steel lining on one side.
 - 1. Hilti CP 643N Firestop Collar
 - 2. Hilti CP 644 Firestop Collar.
 - 3. Hilti CP 645 / 648 E Wrap Strips.
- J. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
 - 1. Acceptable materials are "BIO FIRESHIELD "Novasit K-10".
- K. Pillows/Bags / Pads: 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. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
 - 1. Hilti CP 617 Firestop Putty Pad
- L. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. Hilti FS-ONE MAX High Performance Intumescent Firestop sealant
 - 2. Hilti CP 620 Fire Foam
 - 3. Hilti CP 601s Elastomeric Firestop Sealant.
 - 4. Hilti CP 606 FS Flexible Firestop Sealant.
- M. Sleeves: Re-penetrable cable management device for electrical and telecommunication cabling and cable bundles for use with appropriate Firestopping sealant, fill mortar, putty or other devices and materials. Concrete assemblies up to 3 hour and Gypsum Board assemblies up to 4 hour.
 - 1. Hilti CP 653 Speed Sleeve.
- N. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. Hilti CP 618 Firestop Putty Stick
 - 2. Hilti CP 658T Firestop Plug.
- O. 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 sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.
- P. Non-curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable.
 - 1. Hilti FS 657 Fire Block
 - 2. Hilti CP 675T Firestop Board / Brick
- Q. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes. electrical busways in raceways, the following products are acceptable:

1. Hilti FS 637 Trowelable Firestop Compound.
- R. Mineral Fiber Fire Safing insulation:
 1. Provide insulation as manufactured by USG INTERIORS, INC. Product "Thermafiber Safing", CAFCO INDUSTRIES LTD., FIBREX INC. or approved equal. Density shall be 4 pcf with thickness to suit condition
 - a. Provide 20 gauge minimum metal plate where required for fire safing support to comply with fire ratings
 - b. Do not use fibrous safing insulation unless it is in conjunction with a compatible smoke seal as specified herein.
- S. Mineral Wool
 1. Loose mineral wool, rated noncombustible when tested according to ASTM E136, free of asbestos and glass fiber, and suitable for stuffing into metal deck flutes to an in place density of 6 to 12 pcf.

2.04 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping 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

3.01 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 the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper or timely completion.
- B. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with 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 penetration firestopping.
 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- C. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- D. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping seal with substrates.

3.03 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support 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 firestopping.
- C. Install fill materials for firestopping 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. Identify the following:
 - a. "WARNING - FIRESTOP MATERIAL - DO NOT DISTURB. NOTIFY BUILDING MANAGEMENT OF ANY DAMAGE".
 - b. Manufacturer Name: _____.
 - c. Product Catalog number: _____.
 - d. Tested System number: _____.
 - e. F rating: _____.
 - f. T rating, if applicable.
 - g. Firestop Contractor name: _____.
 - h. Firestop Contractor Contact Number: _____.
 - i. Firestop Inspection Date & Initials: _____.
 - j. T-rating, if applicable.
 - k. Firestop Contractor name.
 - l. Firestop Contractor Contact Number.
 - m. Firestop Inspection Date & Inspector Initials.

3.05 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping 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 penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

FIRESTOP SCHEDULE

Project No:	Contractor Name and Address:	Date Submitted:
Project Title:	Supplier/Installer Name and Address:	Company Field Advisor Name and Address:
	Manufacturer Name and Address:	

[illegible]

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Joints in or between fire-resistance-rated constructions.
 - 2. Joints at exterior curtain-wall/floor intersections.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.
 - 1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.04 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."
- B. Installer Qualifications: A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:
 - 1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:
 - a. Fire-resistive joint system products bear classification marking of qualified testing agency.
 - b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:

- c. UL - "Fire Resistance Directory."

1.06 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. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.07 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 testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.01 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. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E1966 or UL 2079:
 - 1. Joints include those installed in or between fire-resistance-rated walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
 - 3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hilti, Inc.
 - b. 3M Fire Protection Products.
 - c. Cemco - Cemco Hotrod Type-X.
 - d. Or approved equal
- C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide fire-resistive joint systems with rating determined by ASTM E119 based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa) or ASTM E2307.
 - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
 - 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hilti, Inc.
 - b. 3M Fire Protection Products.
 - c. Or approved equal.

- D. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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 the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.03 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by joints and forming 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - 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.

3.05 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.
- C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.06 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as the 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 joints 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.

3.07 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.
- B. Floor-to-Floor, Fire-Resistive Joint Systems:
 - 1. UL-Classified Systems: FF-S-Insert .
 - 2. Assembly Rating: 1 hour 2 hours.
 - 3. Nominal Joint Width: As indicated.
 - 4. Movement Capabilities: Class I - 15 percent compression, extension, or horizontal shear.
 - 5. L-Rating at Ambient: Less than Insert cfm/ft. (cu. m/s x m).
 - 6. W-Rating: No leakage of water at completion of water leakage testing.
- C. Wall-to-Wall, Fire-Resistive Joint Systems FRJS-Insert:
 - 1. UL-Classified Systems: WW-S-Insert.
 - 2. Assembly Rating: 1 hour 2 hours.

- D. Floor-to-Wall, Fire-Resistive Joint Systems FRJS-Insert:
 - 1. UL-Classified Systems: FW-S-insert .
 - 2. Movement Capabilities: Class I - 15 percent compression, extension, or horizontal shear.
- E. Head-of-Wall, Fire-Resistive Joint Systems FRJS-Insert:
 - 1. UL-Classified Systems: HW-S-Insert.
- F. Bottom-of-Wall, Fire-Resistive Joint Systems FRJS-insert:
 - 1. UL-Classified Systems: BW-S-insert .
 - 2. Assembly Rating: 1 hour 2 hours.
- G. Perimeter Fire-Resistive Joint Systems PFRJS-insert:
 - 1. UL-Classified Perimeter Fire-Containment Systems: CW-S-insert.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Polyurethane joint sealants.
 - 3. Latex joint sealants.
 - 4. Preformed joint sealants.
 - 5. Acoustical joint sealants.

1.03 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 C1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Samples for Verification: For each type of sealant submit a color sample board and one sample joint, 1/2 inch wide by 6 inches long 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, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.04 ACTION SUBMITTALS

- A. See Section 013300 - SUBMITTALS, for Submittal Procedures.
- B. Product Data: For each joint-sealant product indicated.
- C. 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.
- 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.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

- D. 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.
- E. Warranties: Sample of special warranties.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project with a minimum of three (3) years experience in the installation of the work of this section.
- B. Source Limitations: Obtain each kind of joint sealant from single source from 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 C1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.07 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 degrees F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.08 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace 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 joint-sealant manufacturer agrees to furnish 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: Two (2) years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
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

2.01 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: Sealants and sealant primers used inside the weatherproofing system shall 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.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C1248 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 color range.
- G. Sealant Abbreviations:

Use (related to application)

1. NT = Non-Traffic
2. T = Traffic

Type

1. S = Single Component
2. M = Multi-component
3. LM = Low Modulus
4. C = Clear
5. OP = Opaque

Grade

1. NS = Non-Sag

2. NF = Non-Flexible
3. P = Pourable
4. SL = Self-Leveling

Use (related to Material)

1. M = Mortar Contact
2. G = Glass Contact
3. A = Aluminum Contact
4. O = Other Materials
5. I = Immersible

2.02 SILICONE JOINT SEALANTS

- A. Single-Component, Non-sag, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, for Use (application) T; Use (for materials) M and O.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; DOWSIL 790.
 - b. GE Advanced Materials - Silicones; SCS2000 SilPruf LM.
 - c. Pecora Corporation; 301 NS
 - d. Sika Corporation, Construction Products Division; SikaSil-WS 290
 - e. Tremco Incorporated; Spectrem 1.
- B. Single-Component, Non-sag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, for Use (application) T; Use (for materials) M and O
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Pecora Corporation; 311 NS.
 - b. Sika Corporation, Construction Products Division; SilkaSil-728 NS.
 - c. Tremco Incorporated; Spectrem 800.
- C. Single-Component, Pourable, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade P, Class 100/50, for Use (application) T; Use (for materials) M
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 890-SL.
 - b. Pecora Corporation; 310 SL.
 - c. Sika Corporation, Construction Products Division; SilkaSil-728 SL.
 - d. Tremco Incorporated; Spectrem 900 SL.
- D. Mildew-Resistant, Single-Component, Nonsag, Non-staining, Neutral-Curing Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, for Use (application) NT; Use (for materials) M, G, A, and O
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Tremco Incorporated; Tremsil 200.
 - b. Pecora Corporation; 898 NST.
 - c. GE Advanced Materials; SCS1700 Sanitary.

2.03 POLYURETHANE JOINT SEALANTS

- A. Single-Component, Non-sag, non-staining, non-yellowing, moisture curing, paintable, Low VOC, Hybrid Polyurethane (STPU), Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, for Use NT; Use (for materials) M, G, A, and O
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
 - b. Pecora Corporation; Dynatrol I-XL.
 - c. Tremco Incorporated; Dymonic 100.

- B. Single-Component, nonsag, traffic-grade, moisture cured, paintable, fire resistant, Polyurethane Joint Sealant: ASTM C920. Type S Grade NS, Class 35, for Use (application) NT; Use (for materials) M, A, O, and I
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF; Masterseal NP1.
 - b. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - c. Tremco Incorporated; Dymonic 100.
- C. Single-Component, Pourable, Traffic-Grade, moisture cured, Polyurethane Joint Sealant: ASTM C920, Type S, Grade P, Class 35, for Use (application) T; Use (for materials) M, A, and O
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF; MasterSeal SL 1.
 - b. Pecora Corporation; Urexpan NR-201.
 - c. Sherwin-Williams Company, Loxon SL1 Self-Leveling.
 - d. Sika Corporation. Construction Products Division; Sikaflex - 1CSL.
 - e. Tremco Incorporated; Vulkem 45 SSL.
- D. Immersible Multicomponent, Nonsag, Traffic-Grade, Chemically curing, Polyurethane Joint Sealant: ASTM C920, and meets ASTM C1247 test requirements, Type M, Grade NS and SL, Class 25, for Use (application) T; Use (for materials) M, A, O, and I.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sika Corporation, Construction Products Division, Sikaflex - 2c NS EZ
 - b. Master Builders Solutions; MasterSeal NP 2.
 - c. Pecora Corporation; Dynatred.
 - d. Tremco Incorporated; Dymeric 240 FC.

2.04 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF; MasterSeal NP 520.
 - b. GE Advanced Materials; Ultra Seal.
 - c. Pecora Corporation; AC-20+.
 - d. Tremco Incorporated; Tremflex 834.
 - e. Sherwin Williams Company (SherMax Urethanized Elastomeric Sealant).

2.05 PREFORMED JOINT SEALANTS

- A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from Polyurethane foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Tremco Incorporated; Spectrum SimpleSeal.
 - b. Tremco Incorporated; Illmod 600
 - c. Emseal Joint Systems, Ltd.; 25V.
 - d. Schul International Company; Sealtite Standard.

2.06 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, fire resistant, paintable, non-staining acrylic latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; AC-20 FTR.
 - b. Sherwin-Williams Company, Sher-Max Urethanized Elastomeric Sealant
 - c. Tremco Incorporated; Tremflex 834, Acoustical/Curtain Wall Sealant
 - d. USG Corporation; SHEETROCK Acoustical Sealant.

2.07 BUTYL SEALANTS

- A. Butyl Sealant: Manufacturer's non-skinning, non-hardening, non-bleeding permanently flexible gun grade compound to limit sound transmission, seal painted and aluminized metal panels and to act as a vapor barrier for polyethylene barrier films complying with ASTM C919, Use (application) NT; Use (for materials) M, G, A, and O.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; BA-98.
 - b. DOWSIL 335 Butyl Sealant
- B. Butyl Sealant: Manufacturer's one-part gun grade compound formulated from virgin butyl rubber for use as a sealing and glazing compound complying with ASTM C1311, Type S, for Use (application) NT; Use (for materials) M, G, A, and O.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; BC-158.
 - b. Tremco; Tremco Butyl Sealant

2.08 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; 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 C1330, Type C (closed-cell material with a surface skin) Type B (bicellular material with a surface skin) or any of the preceding types, 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. Provide self-adhesive tape where applicable.

2.09 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: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 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.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by 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 or primer 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.

3.03 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

- C. Install sealant backings of kind 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 in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations and at perimeters of acoustical Panel edge channels of Acoustical Panel Ceiling systems. with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written recommendations.

3.04 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 1 test for each 500 feet of joint length thereafter or 1 test per each floor per elevation.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of

product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.05 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.

3.06 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.

3.07 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints in paver and pavement installations.
 - b. Isolation and contraction joints in cast-in-place concrete slabs.
 - c. Tile control and expansion joints.
 2. Sealant Types:
 - a. Silicone Joint Sealant: Single component, non-sag, traffic grade, neutral curing.
 - b. Polyurethane Joint Sealant: Single component, pourable, traffic grade.
 - c. Preformed Joint Sealant: Preformed foam sealant.
 3. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
1. Joint Locations:
 - a. Joints in pedestrian plazas.
 2. Sealant Types:
 - a. Polyurethane Joint Sealant: Immersible, multicomponent, non-sag, traffic grade.
 3. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints in dimension stone cladding.

- d. Joints between metal panels.
 - e. Joints between different materials listed above.
 - f. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - g. Control and expansion joints in ceilings and other overhead surfaces.
 - 2. Sealant Types:
 - a. Silicone Joint Sealant: Single component, non-sag, neutral curing, Class 100/50.
 - b. Polyurethane Joint Sealant: Single component, non-sag, Class 100/50.
 - 3. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
- 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - 2. Sealant Type:
 - a. Polyurethane Joint Sealant: Single component, non-sag, traffic grade.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal non-traffic surfaces.
- 1. Joint Locations:
 - a. Perimeter joints of exterior openings where indicated.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of walls and partitions.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
 - 2. Sealant Type:
 - a. Latex Acrylic based Joint Sealant.
 - 3. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal non-traffic surfaces.
- 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - 2. Sealant Type:
 - a. Silicone Joint Sealant: Mildew resistant, single component, non-sag, neutral curing.
 - 3. Joint-Sealant Colors: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal non-traffic surfaces.
- 1. Joint Location:
 - a. Acoustical joints where indicated.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Acoustical joint sealant.

3.08 SEALANT INSTALLATION LOG

- A. A tabular log of all sealant installations on the project shall be kept and submitted with the O & M manuals at the completion of the project.
- B. Tabular log shall have columns for:
 - 1. Sealant type
 - 2. Sealant installation location
 - 3. Temperature during installation
 - 4. Date of Installation

5. Manufacturer
6. Sealant color installed.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes hollow-metal doors, fixed panels and frames.

1.03 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.04 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.

1.05 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. Samples for Verification:
 - 1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
 - 2. For "Doors" and "Frames" subparagraphs below, prepare Samples approximately 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction.
- D. 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.

1.06 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.07 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 non-vented 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

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door Products; an Assa Abloy Group company.
 - 2. Curries Company; an Assa Abloy Group company.
 - 3. Karpen Steel Custom Doors & Frames.
 - 4. Steelcraft; an Ingersoll-Rand company.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.02 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.
 - 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and 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 257 or UL 9.

2.03 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. Extra Heavy-Duty Doors and Frames: SDI A250.8 - Level 3. At locations indicated in the Door and Frame Schedule.
 - 1. Physical Performance: Level B according to ANSI/SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1 3/4 inches.
 - c. Face: cold-rolled steel sheet, minimum thickness of 0.053 inch (16 gauge) (Level 3).
 - d. Edge Construction: Model 2, Seamless.

- e. Core Materials: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
- 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (16 gauge) (Level 3).
 - b. Construction: Full Profile Weld Type.
- 4. Exposed Finish: Prime.

2.04 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra Heavy-Duty Doors and Frames: SDI A250.8 - Level 3. At locations indicated in the Door and Frame Schedule.
 - 1. Physical Performance: Level A 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: Metallic-coated steel sheet, minimum thickness of 0.053 inch (16 gauge) (Level 3), with minimum A60 coating.
 - d. Edge Construction: Model 2, Seamless.
 - e. Core Materials:
 - 1) Thermal-Rated Doors: Provide doors fabricated with a thermal-resistance value (R-value) of not less than R-10 when tested according to ASTM C1363. Provide Polyisocyanurate insulation.
 - 2) Provide Proprietary Bullet-resistant Core for doors noted as Security Doors on the drawings.
 - (a) Manufacturer: Total Security Solutions or approved equal.
 - (b) Security Level: Level 3 in accordance with UL 752.
 - (c) Hinges: Continuous Geared Hinge provided from factory.
 - 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch (14 gauge) (Level 4), with minimum A60 (ZF120) coating.
 - b. Construction: Full Profile Weld Type.
 - 4. Exposed Finish: Prime.

2.05 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.

2.06 MATERIALS

- A. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- C. Frame Anchors: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M, hot-dip galvanized according to ASTM A153/A153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- E. Grout: ASTM C476, except with a maximum slump of 4 inches, as measured according to ASTM C143/C143M.
- F. Glazing: Comply with requirements in Section 088000 - GLAZING
- G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.07 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 flush closures of same material as face sheets.
 - 5. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
 - 6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - 7. 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. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. 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.
 5. 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) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 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) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 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.
 6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
 8. Terminated Stops: Terminate stops 6 inches above finish floor with a 45 degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- 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 ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in ANSI/SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- F. Stops and Frame Moldings: Provide beveled stops and frame moldings around glazed lites and louvers where indicated. Form corners of interior stops and moldings with mitered hairline joints. Exterior frame moldings shall be welded and ground smooth prior to priming.
1. Single Glazed Lites: Provide beveled fixed stops and moldings welded on secure side of hollow-metal work.
 2. Multiple Glazed Lites: Provide beveled fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide beveled fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Frame profiles shall be beveled unless indicated otherwise on the drawings.

5. Provide beveled loose stops and moldings on inside of hollow-metal work.
6. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.08 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.09 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.01 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.

3.02 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 non-templated, mortised, and surface-mounted door hardware.

3.03 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 of size and profile indicated. Comply with ANSI/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 anti-freezing agents.
- 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
- 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
- 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
- 5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
- 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
- 8. 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. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
 - d. 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.
 - 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 088000 - 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.

3.04 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. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. 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.

- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 081433 - STILE & RAIL WOOD DOORS^{H2M}

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Stile and Rail Wood doors and transom panels; glazed and non-glazed configuration; fire-rated and non-rated.

1.02 RELATED SECTIONS

- A. Section 087100 - DOOR HARDWARE.

1.03 REFERENCES

- A. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.
- B. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2018.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- D. ASTM E152 - Methods of Fire Tests of Door Assemblies.
- E. AWI - Quality Standards of the Architectural Woodwork Institute.
- F. WDMA - National Wood Window and Door Association
- G. Intertek Testing Services - Warnock Hersey - Fire Tests of Door Assemblies.

1.04 DOOR AND PANEL DESCRIPTION

- A. Interior Doors (Non-rated): 1-3/4 inches thick; stile and rail construction.
- B. Interior Doors (Fire-Rated): 1-3/4 inches thick; stile and rail construction, ninety (90) minute rated
- C. Paneling: Species to be same as door

1.05 SUBMITTALS

- A. Submit under provisions of Section 013300 - SUBMITTALS.
- B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, identify cutouts for glazing and louvers.
- C. Product Data: Indicate door core materials and construction; veneer species, type and characteristics; factory machining criteria, factory finishing criteria and hardware preparations and labeling requirements.
- D. Samples: Submit one sample of door construction, 10 x 10 inch in size cut from top or bottom corner of door.
- E. Samples: Submit set of three samples of door veneer, 8 x 10 inch in size illustrating wood , stain and sheen color variation.]

1.06 REGULATORY REQUIREMENTS

- A. Fire Door Construction: Conform to ASTM E152, NFPA 252, Warnock Hersey International.
 - 1. Doors constructed to meet UL-10-C.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 016500 - NON-PENETRATING ROOFTOP SUPPORT SYSTEMS and manufacturer's instructions.
- B. Accept doors on site in manufacturer's standard packaging. Inspect for damage upon receipt.
- C. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week.
- D. Break seal on packages while at site to permit ventilation.
- E. If any door is to be field finished, the total surface of the door must be fully block sanded in a horizontal position with 150 to 180 grit sandpaper to remove all grain raise, handling marks, damage or other residual attributes and to soften compressed wood grain, leaving uniformly prepared surfaces before any stain is applied.

1.08 COORDINATION

- A. A. Coordinate work under provisions of Section 013100 - PANELBOARDS.
- B. Coordinate the work with door opening construction, door frame and door hardware installation.

1.09 WARRANTY

- A. Provide manufacturer's warranty under provisions of Section 017800 - HOLLOW METAL DOORS AND FRAMES to the following term:
 - 1. Interior Stile and Rail Doors: Lifetime
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction,.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Marshfield Door Systems
- B. Other acceptable manufacturers:
 - 1. Maiman Door
 - 2. Eggers
 - 3. Or approved equal.

2.02 DOOR CONSTRUCTION

- A. Face Veneer: WDMA A grade. Veneer species: Oak or as required to match existing species. Veneer cut: Plain Sliced and Rift Cut to match existing veneers.
 - 1. Veneer orientation on top, cross and bottom rails shall run between the vertical stiles, and mullions shall run between horizontal rails. Components shall be selected for compatibility of color, member-to-member. Veneer match between adjacent flitch leaves within a single panel shall be random running slip. Veneer sequence between adjacent panels shall be selected for compatibility of grain and color. Veneered panel sequence between paired doors shall be selected for compatibility in general appearance.

2.03 MATERIALS

- A. Stiles, Rails, Mullions and Cross rails: Shall be solid core construction using wood species to match existing doors. Joints to be tongue and grooved, doweled, and glued under pressure with Type I, waterproof glue.
- B. Panels: Solid core with perimeter shaped to proper contour, with panels to match existing doors. Panel edge concealed after assembly by solid lumber sticking bead. Panels edges shall be machined to produce have raised panel profile to match existing doors
- C. Sticking: Beveled profile to match existing door sticking, coped at corners, same species as face veneer. Overall Thickness: 1 3/4 inch
 1. Top Rail: 5 inches or as detailed.
 2. Lock Rail: 7-1/2 inches or as detailed.
 3. Stiles: 5 inches or as detailed.
 4. Bottom Rail: 8 1/2 inches.
 5. Cross rails & Mullions 3 5/8 or as detailed.
 6. Muntin Bars: 1/2 inch or as detailed
- D. The outer most vertical edges of the lock or hinge stiles, on single doors: lumber of same specie as face veneer.
- E. Meeting vertical edge (lock edge) of stiles on fire rated pair doors: Fire treated Maple lumber, veneer banded to match face veneers.

2.04 ADHESIVES

- A. Facing Adhesive: Type I - waterproof.

2.05 ACCESSORIES AND FIRE-RATED GLAZING AND ACCESSORIES

- A. Wood Louvers:
 1. Material and Finish: Species as selected. Transparent or Opaque finish as specified.
 2. Louver Blades: Inverted V.
- B. Glazing Stops: Wood, of same specie as face veneer, shall match sticking profile, and have mitered corners. Glazing stops retaining factory glass and glazing to be affixed with counter sunk nails.
- C. Fire-rated Door, Transom and Sidelight Glazing: Firelite PLUS, 5/16" thick fire-rated as manufactured by Technical Glass Products or approved equal.

2.06 GLAZING FRAMES

- A. Factory Glazing Installation: Factory install glass in fire rated doors. Fill wood glazing bead nail holes in factory finished doors. Cover metal fire-rated glazing frame fastening locations with wood veneer as specified herein.
 1. Wood Species: Same species as door faces.
 2. Profile: Lipped tapered beads, profile per Marshfield W-2 or as required to match existing profiles .
 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips as required and approved for such use.

2.07 FABRICATION

- A. Fabricate ninety (90) minute fire-rated and non-rated doors in accordance with specified manufacturers' and Intertek Testing Services - Warnock Hersey requirements. Attach fire rating label to the door.
- B. Door Company shall have the ability to provide fire-rated meeting stiles on double doors in lieu of overlapping metal edge and astragals as noted below:.
- C. Astragals for fire-rated double doors can only be fabricated of steel materials and be of specific configurations; refer to referenced fire test assembly for material and type. Astragals are usually provided by a door manufacturer and are not usually provided under the door hardware listings. Marshfield Door Systems has the approval to use fire treated meeting stiles on paired doors in lieu of an overlapping metal edge and astragal. However; all manufacturers do not. Certain vertical rod panic devices may require special astragal shapes, installation and may violate label ratings.
- D. Astragals for 90 Minute Fire-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge at mid-door thickness, specifically for double doors.
 - 1. Provide ninety (90) minute paired openings with doors not requiring an overlapping metal edge or astragal; Veneer band meeting stile edges to match face species.
 - 2. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- E. Factory pre-fit doors for frame opening dimensions identified on shop drawings.

2.08 FINISH

- A. Factory finish doors in accordance with WDMA in accordance with WDMA IS 6A-11:
 - 1. Finish Doors: System TR-6, custom grade quality, as selected by the Architect.
 - 2. Factory finish doors in accordance with approved sample.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs. Any deficiencies must be corrected prior to door installation.
 - a. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Hardware: For installation, see Sections 087100 "Door Hardware" and Section 061000 - "Rough Carpentry"
 - 1. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- B. Install fire-rated doors according to NFPA 80.
- C. Install smoke- and draft-control doors according to NFPA 105.

- D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 3. Trim bottom rail only to extent permitted by labeling agency.
- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
 - 1. Factory-Finished Doors: Do not trim factory finished doors for width.

3.03 ADJUSTING

- A. Operation: Correct any deficiency that prohibits the door from swinging or operating freely. Do not remove hinge screws after initial insertion. Shims used for alignment purposes must be inserted between hinge and frame. Do not insert shims between hinge and door.
- B. To prevent stile failure, insure that door closers are properly adjusted and do not limit the door opening swing. Limit door opening swing only with a properly located stop.
 - 1. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes:
 - 1. Provide FRP Doors and Frames and all associated FRP Doors and Frames accessories and components in accordance with the Contract Documents and as required for a complete installation. The work of this section shall include, but not be limited to the following:
 - a. Fiberglass Reinforced Plastic (FRP) Doors
 - b. Fiberglass Resin Transfer Molded Door Frames
 - c. FRP accessories as noted on the drawings and related hardware.

1.02 REFERENCES

- A. AAMA 1304 - Voluntary Specification for Determining Forced Entry Resistance of Side-Hinged Door Systems; 2018.
- B. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011.
- C. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.
- D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.
- E. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials; 2019.
- F. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2017.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.
- H. ASTM F1642 - Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings; 2012.
- I. Laminate Properties
 - 1. ASTM D822/D822M - Tensile Strength
 - 2. ASTM D790 - Flexural Strength
 - 3. ASTM D2583 - Barcol Hardness
 - 4. ASTM D256 - Impact Resistance
 - 5. ASTM D792 - Density/Specific Gravity Of Laminate
 - 6. ASTM D1761 - Mechanical Fasteners
- J. Core Properties
 - 1. ASTM C177 - Thermal Properties
 - 2. ASTM D1622 - Density/Specific Gravity
 - 3. ASTM E84 - Surface Burning Characteristics
 - 4. WDMA TM-10 and TM-5 Firestop, ASTM E 152 and UL 10B
- K. Louver Properties
 - 1. AMCA 500-L - (Air Movement Control Association) - Test Method for Louvers.
 - 2. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.

1.03 QUALIFICATIONS

- A. Manufacturer Qualifications: A company specialized in the manufacture of fiberglass reinforced plastic (FRP) doors and frames as specified herein with a minimum of 30 years documented experience and with a record of successful in-service performance for the applications as required for this project.
- B. Installer Qualifications: An experienced installer who has completed fiberglass door and frame installations similar in material, design, and extent to those indicated and whose work has resulted in construction with a record of successful in-service performance.
- C. Source Limitations: Obtain fiberglass reinforced plastic doors and frames through one source fabricated from a single manufacturer, including fire rated fiberglass frames.
- D. Source Limitations: Hardware and accessories for all FRP doors as specified in Section 087100 - DOOR HARDWARE should be provided and installed by the fiberglass door and frame manufacturer.
- E. Source Limitations: Glass for windows in doors shall be furnished and installed by door and frame manufacturer in accordance with related section, Division 08, Glazing.

1.04 SUBMITTALS

- A. Submit product technical data including:
 - 1. Acknowledgment that products submitted meets requirements of standards referenced
 - 2. Manufacturer shall provide certificate of compliance with current local and federal regulations as it applies to the manufacturing process.
 - 3. Manufacturer's installation instructions.
 - 4. Schedule of doors and frames indicating the specific reference numbers as used on drawings, door type, frame type, size, handing and applicable hardware.
 - 5. Details of core and edge construction. Include factory-construction specifications.
 - 6. Certification of manufacturer's qualifications.
- B. Submittal Drawings for approval shall be submitted prior to manufacture and include the following information:
 - 1. Summary door schedule indicating the specific reference numbers as used on owner's drawings, with columns noting door type, frame type, size, handing, accessories and hardware.
 - 2. A drawing depicting front and rear door elevations showing hardware with bill of material for each door.
 - 3. Drawing showing dimensional location of each hardware item and size of each door.
 - 4. Individual part drawing and specifications for each hardware item and FRP part or product.
 - 5. Construction and mounting detail for each frame type.
- C. Operation and Maintenance Manuals:
 - 1. Include recommended methods and frequency for maintaining optimum condition of fiberglass doors and frames under anticipated traffic and use conditions.
 - 2. Include one set of final as built drawings with the same requirements as mentioned in Section B above.
 - 3. Include certificate of warranty for door and frame listing specific door registration numbers.
 - 4. Include hardware data sheets and hardware manufacturer's warranties.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Each door and frame should be delivered individually crated for protection from damage in cardboard containers, clearly marked with project information, door location, specific reference number as shown on drawings, and shipping information. Each crate should contain all fasteners necessary for installation as well as complete installation instructions.
- B. Store doors in the original container out of inclement weather for protection against the elements.
- C. Handle doors pursuant to the manufacturer's recommendations as posted on outside of crate.
- D. All single doors shall be shipped completely assembled in the frame with hardware installed. Double doors shall be prehung at the factory to ensure proper fit and that the hardware functions properly, then disassembled for shipping purposes.

1.06 WARRANTY

- A. All fiberglass doors and frames shall have a lifetime warranty against failure due to corrosion. Additionally, warranty all fiberglass doors and frames on materials and workmanship for a period of 10 years, including warp, separation or delamination, and expansion of the core.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Chem-Pruf Door Co., Ltd., P.O. Box 4560, Brownsville, Texas 78523, 1-800-444-6924, Fax: 956-544-7943, Website: www.chem-pruf.com
- B. Substitutions may be considered provided that the manufacturer can comply with the specifications as written herein and the products are manufactured in the United States of America. Request for substitution shall be submitted in accordance with Section 012500 - WOOD I-JOISTS.

2.02 MANUFACTURED UNITS

- A. Doors: Manufactured with fiberglass reinforced plastic (FRP) using Class 1 premium resin with no fillers that is specifically tailored to resist chemicals and contaminants for which these specifications are written. Doors shall be 1 3/4 inch thick and of flush construction, having no seams or cracks. All fiberglass components including face plates, stiles, rails and frames shall be fabricated by the same manufacturer. All doors up to 4'-0" x 8'-0" shall have equal diagonal measurements with a maximum tolerance of +/- 1/32 inch.
- B. Door Plates: 1/8 inch thick, molded in one continuous piece, starting with a 25 mil gelcoat of the color specified, integrally molded with at least two layers of 1.5 ounce per square foot fiberglass mat and one layer of 18 ounce per square yard woven roving. This will yield a plate weight of 0.97 lbs per square foot at a ratio of 30/70 glass to resin. Plate alone shall withstand Large Missile Impact per FBC TAS 201.
- C. Stiles and Rails shall be constructed starting from the outside toward the inside, of a 25 mil gel coat of the color specified followed by a matrix of at least three layers of 1.5 ounce per square foot of fiberglass mat. The stile and rail shall be molded in one continuous piece to a U-shaped configuration and to the exact dimensions of the door. In this manner there will be no miter joints or disparate materials used to form the once-piece stile and rail.

- D. Core material: shall be Polypropylene plastic honeycomb core with a non-woven polyester veil for unparalleled plate bonding, 180 psi typical compression range, 2 pound SPF expanded polyurethane foam, or mineral core per owners specifications, which completely fills all voids between the door plates. Foam properties ASTM E84 that comply with the IBC Code.
- E. Internal Reinforcement shall be a firestop material of sufficient strength and amount to adequately support required hardware and function of same.
- F. Finish of door and frame shall be identical in color and texture. At time of manufacture, 25 mil of resin-rich gelcoat must be integrally molded into both the door and frame producing a smooth, dense, non-porous gloss surface. The gelcoat shall be cured within a temperature range of 120 to 170 degrees F creating an impermeable outer surface, uniform color throughout and a permanent homogenous bond with the resin/fiberglass substrate beneath. Secondary painting to achieve color is not acceptable. The finish of the door shall be field repairable without compromising the integrity of the original uniform composite structure, function or physical strength.
- G. Window openings shall be provided for at time of manufacture and shall be completely sealed so that the interior of the door is not exposed to the environment. Fiberglass retainers, which hold the glazing in place, shall be resin transfer molded with a profile that drains away from glazing. The window retainer must match the color and finish of the door plates with 25 mil of resin-rich gelcoat integrally molded in at time of manufacture. Mechanical fasteners shall not be used to attach retainers. Glass, as specified herein, shall be furnished and installed by door and frame manufacturer. In order to maintain uniform appearance, product longevity and the corrosion resistance this application requires, window retainers fabricated from Metal, PVC or Vinyl will not be accepted.
- H. Louver openings shall be completely sealed so that the interior of the door is not exposed to the environment. Louvers are to be solid fiberglass "V" Vanes and shall match the color and finish of the door plates.
- I. Transoms shall be identical to the doors in finish, construction, materials, thickness and reinforcement.

2.03 FRAMES

- A. Frames shall be fiberglass and manufactured using the resin transfer method creating one solid piece in closed rigid molds to assure uniformity in color and size. Beginning with a minimum 25 mil gel coat and a minimum of two layers continuous strand fiberglass mat saturated with resin, the frame will be of one-piece construction with molded stop. All frame profiles up to 3/4 inch shall be solid fiberglass. All frame profiles greater than 3/4" shall have a core material of 2 psf polyurethane foam. Metal frames or pultruded fiberglass frames will not be accepted.
- B. Finish of frame shall be identical in color and texture to the door 25 mil resin rich gel coat will be integrally molded into the frame at time of manufacture. The gelcoat shall be cured within a temperature range of 120 to 170 degrees F creating an impermeable outer surface, uniform color throughout and a permanent homogenous bond with the resin/fiberglass substrate beneath. Secondary painting to achieve color is not acceptable. The finish of the door shall be field repairable without compromising the integrity of the original uniform composite structure, function or physical strength.
- C. Jamb/Header connection shall be mitered for tight fit.
- D. Internal Reinforcement shall be continuous within the structure to allow for mounting of specified hardware. Material shall be completely non-organic with a minimum hinge screw holding value of 1000 lbs per screw. Documented strength of frame screw holding value after third insert must

be submitted. Dissimilar materials, such as steel, will be deemed unacceptable as reinforcement for hardware attachment.

- E. Mortises for hardware shall be accurately machined by CNC to hold dimensions to +/- 0.010 inch in all three axis.
- F. Hinge pockets shall be accurately machined by CNC to facilitate heavy duty hinges at all hinge locations, using spacers when standard weight hinges are used.

2.04 HARDWARE

- A. See Section 080671 - HARDWARE SCHEDULE and 087100 - DOOR HARDWARE and as indicated on the drawings.
- B. Due to the special nature of the material in this section, all related hardware as specified must be furnished and installed by the door and frame manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions
 - 1. Openings are correctly prepared to receive doors and frames.
 - 2. Openings are correct size and depth in accordance with shop drawings or submittals.
- B. Installer's Examination
 - 1. The installer shall examine conditions under which construction activities of this section are to be performed and submit a written report if conditions are unacceptable.
 - 2. Transmit two copies of the installer's report to the Architect / Engineer within 24 hours of receipt.
 - 3. Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.

3.02 INSTALLATION

- A. Doors shall be delivered at job site individually crated. Each crate to be clearly marked with the specific opening information for quick and easy identification.
- B. All single doors to be shipped completely assembled in the frame with hardware installed. Double doors to be prehung at the factory to ensure a proper fit and that hardware functions properly, then disassembled for shipping purposes.
- C. Install door-opening assemblies in accordance with shop drawings and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.
- D. Field alteration of doors or frames to accommodate field conditions is strictly prohibited.
- E. Site tolerances: Maintain plumb and level tolerance specified in manufacturer's printed installation instructions.
- F. Fire labeled doors, frames and associated hardware must be installed by qualified professional installers in strict accordance with the manufacturer's instructions and the latest revision of NFPA 80.

3.03 ADJUSTING

- A. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding and to remain in place at any angle without being moved by gravitational influence.
- B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instructions.

3.04 CLEANING

- A. Clean surfaces of door opening assemblies and exposed door hardware in accordance with respective manufacturer's maintenance instructions.

3.05 PROTECTION OF INSTALLED PRODUCTS

- A. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Fire-resistive rated access door and frame units for wall and ceilings.

1.03 REFERENCES

- A. ASTM E 152 - Standard Methods of Fire Tests of Door Assemblies
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2018.
- E. NFPA 288 - Standard Methods of Fire Tests of Horizontal Fire Door Assemblies Installed in Horizontal Fire Resistance-Rated Assemblies; 2022.
- F. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- G. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Section 013300 - SUBMITTALS: Procedure for submittals.
- B. Shop drawings: Fully describe and locate all items being furnished and include large scale details of principal construction features and internal reinforcement. Indicate dimensions, elevations, hardware, reinforcement, anchor types and spacing, and finishes.
- C. Product Data: Indicate door and frame configuration and finishes with manufacturer's standard details and catalog data demonstrating compliance with referenced standards
- D. Samples: For each door face material, at least 3 by 5 inches (75 by 125 mm) in size, in specified finish.
- E. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Minimum five years documented experience producing products specified in this section.
- B. Installer: Minimum five years documented experience installing products specified in this section.

PART 2 - PRODUCTS

2.01 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 according to 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 fire-rated access door assemblies installed vertically.
 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.02 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
1. Acudor Products, Inc.
 2. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
 3. Karp Associates, Inc.
 4. Milcor Inc.
 5. Nystrom, Inc.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Flush Access Doors with Exposed Flanges:
1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 2. Locations: Wall and ceiling.
 3. Metallic-Coated Steel Sheet for Door: 0.070 inch, 14 gauge steel sheet thickness for Fire-rated access doors and 20 gauge (0.0359 inch) single thickness steel sheet for non-fire rated access doors.
 - a. Finish: Factory prime
 4. Hinges: 175 degree stainless steel piano hinge concealed constant force closure spring type.
 5. Hardware: Self latching, key operated.
- D. Flush Access Doors with Concealed Flanges:
1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
 2. Locations: Wall and ceiling .
 3. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage
 - a. Finish: Factory prime.
- E. Fire-Rated, Flush Access Doors with Concealed Flanges
1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide frame with gypsum board beads for concealed flange installation.
 2. Locations: Wall and ceiling.
 3. Fire-Resistance Rating: Not less than that of adjacent construction.
 4. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch (1.02 mm), 20 gage.
 - a. Finish: Factory prime.
- F. Hardware:

1. Latch: Self-latching bolt operated by flush key with interior release or as indicated for each door.
- G. Locks:
1. Cylinder locks keyed alike for each door panel. Provide 2 keys per access panel. Coordinate locks and keying with the Owner's requirements and existing keying system(s) where applicable.

2.03 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Stainless Steel: Type 304, brushed #4 finish.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F 2329. At stainless steel doors, provide stainless steel fasteners.

2.04 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 doors to types of supports indicated.
 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 2. Provide mounting holes in frames for attachment of units to metal or wood framing.
 3. Provide mounting holes in frame for attachment of masonry anchors.

2.05 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.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates 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.

3.02 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Verify that field measurements, surfaces, substrates and project conditions are as required and suitable for installation. Verify that rough openings for door and frame are correctly sized and located. Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.
- D. Secure rigidly in place.
- E. Position unit to provide convenient access to concealed work requiring access.

3.03 ADJUSTING

- 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

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 01 Specification Sections, apply to this Section.

1.02 DESCRIPTION OF WORK

- A. Provide all plant, labor, materials, accessories, equipment, incidentals, scaffolds and supervision necessary to complete window installations with hardware, exterior trim, components and related work shown and/or specified including but not necessarily limited to the following:
 - 1. Projected Windows.
 - 2. Fixed/Transom Windows.
 - 3. Miscellaneous trim, closures, brake metals, receptors, panning, sills, mullions, mullion covers, and flashing.
- B. Related Work Specified Elsewhere:
 - 1. Joint Sealants: Division 07
 - 2. Aluminum Entrances and Storefronts: Division 08
 - 3. Glazing for additional requirements: Division 08

1.03 DEFINITIONS

- A. AW: Architectural Performance Classification as defined by AAMA/WDMA/CSA 101/I.S.2/A440 standards.
- B. Performance grade number, included as part of the AAMA/NWWDA product designation code, is actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.
- C. Structural test pressure, for uniform load structural test, is equivalent to 150 percent of design pressure.
- D. Minimum test size is smallest size permitted for performance class (gateway test size) or as specified elsewhere in this section, whichever is more stringent. Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class. Downsized test reports will not be considered acceptable.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of test size indicated below:
 - 1. Projected Windows: 60 inches x 144 inches
 - 2. Fixed Windows: 60 inches x 99 inches
- B. AAMA/NWWDA Performance Requirements: Provide aluminum windows of the performance class and grade indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Performance Class: AW-PG70 for Projected Windows
 - 2. Performance Grade: AW-PG160 for Fixed and Transoms.
- C. Structural Performance: Provide aluminum windows capable of withstanding the following, including wind loads based on passing , Uniform Load Structural Test, at AAMA/WDMA/CSA 101/I.S.2/A440 basic wind speed indicated:

1. Deflection: Based on passing , Uniform Load Deflection Test. AAMA/WDMA/CSA 101/I.S.2/A440
 - a. 70 psf (positive and negative) Projected Windows.
 - b. 160 psf (positive and negative) - Fixed Windows.
 2. Uniform Load Structural Test:
 - a. 105 psf (positive and negative) Projected Windows.
 - b. 240 psf (positive and negative) - Fixed Windows.
 3. Basic Wind Speed: As indicated in miles per hour at 33 feet above grade. Determine wind loads (30 lbf/sq. ft. minimum) and resulting design pressures applicable to Project according to the following, based on mean roof heights above grade as indicated on Drawings:
 - a. ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 6.4.2, "Analytic Procedure."
 - b. Appendix B in AAMA/WDMA/CSA 101/I.S.2/A440.
- D. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA/CSA 101/I.S.2/A440, Air Infiltration Test.
1. Maximum Rate: (Tested at an inward test pressure of 6.24 lbf/sq. ft)
 - a. 0.10 cfm/sq. ft. of area for Projected Windows
 - b. 0.01 cfm/sq. ft. of area for Fixed Windows
- E. Water Resistance: No water leakage as defined in AAMA/WDMA/CSA 101/I.S.2/A440 referenced test methods at a water test pressure equaling that indicated, when tested according to, Water Resistance Test.
1. Test Pressure: 20 percent of positive design pressure, but not less than 25 lbf/sq. ft.
- F. Forced-Entry Resistance: Comply with Performance Level 10 requirements when tested according to ASTM F588.
- G. Condensation-Resistance Factor: Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a minimum CRF of 62.
- H. Thermal Transmittance: Provide aluminum windows with a whole-window U-value maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested in a dual glazed version (reports based on windows glazed with insulating glass will not be acceptable) according to AAMA 1503.
1. U-Value (Btu/sq. ft. x h x deg F):
 - a. Maximum 0.33 (0.24 Glass / Warm Edge) for Projected Windows
 - b. Maximum 0.33 (0.24 Glass / Warm Edge) for Fixed Windows
 2. SHGC: 0.33
- I. Thermal Movements: Provide aluminum windows, including anchorage, that accommodate thermal movements of units without buckling, distortion, opening of joints, failure of joint sealants, damaging loads and stresses on glazing and connections.
- J. Projected Windows: Must be flush vent type (overlapping vents will not be acceptable) and must comply with AAMA/WDMA/CSA 101/I.S.2/A440 for the following tests, in addition to Gateway Performance Requirements:
1. Hardware Load Test.
 2. Sash Torsion Test.
 3. Torsion Test.
 4. Horizontal Concentrated Load Test on Latch Rail.
 5. Vertical Concentrated Load Test on Latch Rail.
 6. Torsion Load Test on Intermediate Frame Rails.
 7. Vertical Concentrated Load Test on Intermediate Frame Rails.

8. Balance Arm Load Test.
 9. Life Cycle Testing: When tested in accordance with AAMA 910.
- K. Sliding Windows: In addition to Gateway Performance Requirements, comply with for the following tests: AAMA/WDMA/CSA 101/I.S.2/A440
1. Operating Force.
 2. Deglazing: When tested in accordance to ASTM E987.
 3. Life Cycle Testing: When tested in accordance with AAMA 910.
- L. Fixed Windows: Comply with the Gateway Performance Requirements of AAMA/WDMA/CSA 101/I.S.2/A440.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's complete specifications, construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, subframes, trims, closures, etc., hardware, finishes, and operating instructions for each type of aluminum window indicated.
- B. Shop Drawings: Before proceeding with the manufacture of windows, Contractor shall prepare and submit verified and complete dimensioned plans, elevations, sections, large-scale details including interface and method of anchoring to adjacent construction, trims, metal thickness, hardware, attachments to other work, operational clearances, and including, but not limited to, the following:
1. Mullion details, including reinforcement and stiffeners.
 2. Joinery details.
 3. Weather-stripping details.
 4. Thermal-break details.
 5. Glazing details.
 6. Insulated Panel construction.
 7. For products indicated to comply with design loads, include structural analysis data signed and sealed by the licensed professional engineer registered in the state having jurisdiction responsible for their preparation and used to determine the structural test pressures and design pressures from basic wind speeds indicated.
 8. Submit any other components as required for Architect's approval. No fabrication shall be started until such approval is received. Contractor will verify all opening dimensions in the field and be responsible to provide proper size window units to fit all existing openings and note same on Shop Drawings.
- C. Submit Certified Test Reports from an AAMA accredited laboratory certifying the performance of each type of window specified. Test reports shall be no more than 4 years old and accompanied by AAMA Notice of Certification stating that the tested window meets or exceeds the specified performance criteria for the current appropriate window types. AAMA/WDMA/CSA 101/I.S.2/A440. Manufacturer shall also certify that Certified Test Reports are for window sample submitted, and for windows to be used on this Project.
- D. Pre-Installation Conference: Submit copies of pre-installation conference records.
- E. Maintenance Data: For operable window sash, operating hardware, and finishes to include in maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Product Qualifications: In order to confirm that the proposed product(s) conform to the material and performance requirements contained in these specifications, bidders shall include the

following with their bid. Failure to comply with these requirements shall cause the bid to automatically be rejected.

1. Product Test Reports: Bidders submitting bids based on products other than the Basis of Design product listed in Paragraph 2.01.A must also include with their bid comprehensive test reports not more than four years old prepared by a qualified testing agency for each window type being used on the project. Test reports based on the use of downsized test units will not be accepted. Thermal Tests must reflect the U-values as specified.
 2. Product Details: Bidders submitting bids based on products other than the Basis of Design product listed in Paragraph 2.01.A must also include with their bid full size product details showing all frame and sash details, dimensions, thermal break construction, wall thicknesses and joinery. Details must accurately reflect all glazing and hardware options specified herein.
- B. Product Requirements: For maximum performance, windows for this project must meet both the testing requirements as contained herein and the minimum material requirements specified. Windows that carry the applicable AAMA rating but do not meet the material thicknesses, depths, etc. shall not be acceptable for use on this project.
- C. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E548.
- E. Single Source Responsibility: Provide all window types listed by a single manufacturer. All components of windows including sub-frames, trims, framing, etc. shall be by the same manufacturer. Splitting of types of windows such as sliding, fixed windows by different manufacturers is not acceptable.
- F. Product Criteria: Information on Drawings and in Specifications establish requirements for aluminum window design and performance characteristics. Design characteristics 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 pre-construction testing, field testing, and in-service performance.
- G. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.
- H. Pre-Installation Conference: Conduct conference at Project site to comply with project management and coordination requirements of the project. Review methods and procedures related to aluminum windows including, but not limited to, the following:
1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 2. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review required testing and inspecting procedures.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify all window openings and conditions by field measurements before fabrication and indicate measurements on shop drawings.
- B. Established Dimensions: Where field measurements cannot be made without delaying the work, establish opening dimensions and proceed with fabricating windows without field

measurements. General Contractor shall coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.08 WARRANTY

- A. Special Warranty: Submit a written warranty signed by aluminum window manufacturer agreeing to repair or replace window that fail in materials or workmanship within the specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection.
 - c. Water leakage, air infiltration, or condensation.
 - d. Faulty operation of movable sash and hardware.
 - e. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period:
 - a. Windows: Five years after date of Substantial Completion for the total window system.
 - b. Insulated Glazing: Ten years after date of Substantial Completion.
 - c. Painted Metal Finishes:
 - 1) Twenty years from date of Substantial Completion for an AAMA 2605 High-Performance Finish
 - 2) Five years from date of Substantial Completion for an AAMA 2603 Baked Enamel Finish
- B. Deficiencies due to such elements not meeting the specifications shall be corrected at no expense to the Owner during the warranty period.

1.09 WORK SCHEDULE

- A. Two weeks before actually starting window replacement work at the site Contractor will meet with the Architect and Owner to establish a work schedule acceptable the Owner. Contractor will not change approved schedule without prior approval.
- B. No windows will be removed unless Contractor can replace them with new units prior to end of day's work.

1.10 SAMPLE WINDOW INSTALLATION

- A. Prior to the actual starting of the project, Contractor will install a sample replacement unit in the opening selected by the Owner for the architect's and Owner's approval. The Sample will be typical of completed window installations showing all elements including but not limited to: frames, sash, mullions, trim, casings, weeps, sills, caulking, etc. for a complete installation.

PART 2 PRODUCTS

2.01 MANUFACTURER:

- A. Basis-of-Design Products: The Basis of Design for these specifications are the Series 7090i Fixed as manufactured by Architectural Window Manufacturing Corporation, Rutherford, New Jersey.
- B. Equivalents: Subject to compliance with all material and performance requirements outlined in these specifications, "or equal" products by other manufacturers proposed with all required supporting information no less than ten days prior to the bid opening will be considered for use subject to review by the Architect. The Architect's decision regarding equivalency is final.

Products considered approved equivalents must be issued in writing via addendum to all bidders.

2.02 MATERIALS:

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength, and not less than:
 - 1. 0.080-inch thickness at any location for the main frame and sash members, except the frame sill which shall be a minimum of 0.125-inch. (Double Hung and Sliding Windows).
 - 2. 0.080-inch thickness at any location for the main frame (Fixed windows).
- B. Frame/Sash Depth:
 - 1. 2 3/4 inches minimum frame depth: (Projected Windows)
 - 2. 5 inches minimum frame depth: (Fixed and Transom Windows).
- C. Brake Formed Aluminum: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, and not less than 0.062 inch thickness.
- D. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
 - 1. All fasteners must be concealed except where unavoidable for application of hardware.
 - 2. For application of hardware, where required, use non-magnetic stainless steel phillips flat head machine screws.
- E. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- F. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing between adjoining window frames and/or perimeter subframe conditions. Weather stripping will be completely concealed when aluminum window is closed and installation is complete.
 - 1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA/CSA 101/I.S.2/A440.
- G. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
 - 1. Polypropylene sheet or polypropylene-coated material. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.
- H. Replaceable Weather Seals: Comply with AAMA 701/702.
- I. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.03 INSULATED GLAZING:

- A. Insulated Glazed Construction: All windows in the referenced areas (except those receiving insulated panels) shall be factory glazed with hermetically sealed 1" insulating glass units with a dual seal of polyisobutylene and silicone and a dessicant filled aluminum spacer. Insulated glass must be set into a continuous bed of silicone sealant and held in place with removable

extruded aluminum snap-in beads. Wrap around (marine) glazing which requires the removal and disassembling of the sash for re-glazing will not be acceptable. Units must be IGCC certified for a CBA rating level.

- B. Insulated Low-E Window Glazing:
 - 1. Manufacturer: Viracon VE1-48
 - 2. Total Thickness: 1 inch
 - a. Exterior Glass Ply:
 - 1) Thickness: 1/4 inch
 - 2) Tint: Clear
 - 3) Type: Heat Strengthened Glass
 - 4) Coating: Pyrolitic Low-E (#2 surface)
 - b. Interspace content: Argon.
 - c. Spacer Type: Warm Edge. (VTS)
 - d. Seal: Silicone - Black
 - e. Interior Glass Ply:
 - 1) Thickness: 1/4 inch
 - 2) Tint: Clear.
 - 3) Type: Tempered Glass
 - 3. Performance Requirements:
 - a. Visible Light Transmittance: 0.47
 - b. Winter U-Value: 0.27
 - c. Summer U-Value: 0.24
 - d. Shading Coefficient: 0.43
 - e. Solar Heat Gain Coefficient: 0.37

2.04 DUAL GLAZING / INTEGRAL BLINDS

- A. Integral Blinds:
 - 1. Integral Louver Blinds: Provide remotely operated horizontal louver blinds in the space between two panes of dual glazing. Construct blinds of aluminum slats, approximately 5/8-inch wide, with polyester fiber cords, equipped for tilting by standard operating hardware located on inside face of sash. Blind controls exceeding 72" above the finished floor shall utilize pole operated white bronze hardware.

2.05 HARDWARE:

- A. Hardware in General: Provide manufacturer's standard hardware fabricate from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows and of size and strength to accommodate sash or ventilator weight, dimensions and operation. Do not use aluminum in friction contact with other metals.
- B. Locks and Latches in General: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- C. Pole Operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than 60 inches above floor; 1 pole operator and pole hanger per room that has operable windows with a pole operated locking mechanism more than 72 inches above floor.
- D. Projected Windows: Provide the following operating hardware:
 - 1. Hinge: Concealed stainless steel four-bar friction hinge with adjustable-slide friction shoe; two per ventilator.

2. Lock: Cam-action, white bronze locking handle and keeper (two per ventilator over 42" wide).
3. Lock: Provide pole-operated automatic white bronze locks on inward acting ventilators, where the distance to the operating hardware exceeds six feet above the floor.
4. Lock: Manual remote window system operators as manufactured by Clearline Incorporated where noted on drawings.
5. Lock: One painted zinc die cast scissor arm (roto) operator at sill and one painted zinc die cast single point lock at each jamb.
6. Limit Device: Integral adjustable stainless steel, stop (two per ventilator)

2.06 INSECT SCREENS:

- A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Provide insect screens on all operable sash. Locate insect screens on outside of window except mount insect screens on the inside of the window for project-out units and include hinged wickets at each operating latch.
- B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
- C. Extruded-Aluminum Tubular Framing Sections and Cross Braces: Not less than 0.062-inch wall thickness.
 1. 1. Finish: Match aluminum window members.
- D. Aluminum Wire Fabric: 18-by-16 mesh of 0.011-inch diameter, coated aluminum wire.
 1. Wire-Fabric Finish: Charcoal Gray

2.07 ACCESSORIES

- A. Rescue Window Labels: One window per classroom or teaching area shall be deemed a "rescue window", for egress in case of emergency. All rescue windows shall comply with SED regulations and applicable codes and shall include a conforming label. At a minimum, provide the following:
 1. Letters: bright yellow background with black letters
 2. Label size: 3 inches high by 5 inches wide
 3. Text: the words "RESCUE WINDOW" must be visible from Interior and Exterior sides of each rescue window.
 4. Any window treatment/coverings at each of these locations must also have labels.
 5. Visible window operating instructions shall be provided if operation is not readily apparent.

2.08 FABRICATION:

- A. General: Fabricate aluminum windows, in sizes indicated, that comply with requirements and that meet or exceed AAMA/WDMA/CSA 101/I.S.2/A440 performance requirements for the following window type and performance class. Include a complete system for assembling components and anchoring windows.
 1. Projected Windows: AW
 2. Fixed/Transom Windows: AW
- B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed (products with exposed thermal barriers will not be acceptable), low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
 2. No thermal short circuits shall occur between the exterior and interior.
 3. The thermal barrier shall consist of a thermal strut design and consist of two glass reinforced polyamide nylon 6/6 struts mechanically crimped in raceways extruded in the exterior and interior extrusions.
 4. Poured and debridged urethane thermal barriers shall not be permitted.
- D. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.
- E. Weep Holes: Provide weep holes with hinged covers and internal passages to conduct infiltrating water to exterior.
- F. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
- G. Subframes: Provide drainable subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch thick extruded aluminum. Finish to match window units. Provide subframes capable of withstanding design loads of window units. .
- H. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440.
- I. Glazing Stops: Provide snap-on glazing stops coordinated with Division 8 Section "Glazing" and glazing system as indicated. Provide glazing stops to match sash and ventilator frames.

2.09 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Exterior of window:
1. Superior-Performance Organic Finish: AA-C12C42R1x Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: (as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer Two-Coat XL System: Manufacturer's standard Two-Coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color and clear topcoat containing Mica Flakes not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605
 - b. Color: As Selected by the Architect from the manufacturer's full color offering..
- D. Interior of window:
1. Baked-Enamel Finish: AA-C12C42R1x Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating:

(as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

- a. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603.
- b. Color: As Selected by the Architect from the manufacturer's full color offering..

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with installer present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate; coordination with wall flashings, vapor retarders, and other built-in components; operational clearances and other conditions affecting performance of work.
 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
 3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
 4. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Field measure all openings and verify all conditions. Note locations of existing mechanical equipment, guards, wires, etc. are required to be removed or removed, salvaged and reinstalled and incorporate such information into the shop drawings.
- C. Unacceptable conditions shall be reported in writing to the Architect prior to the start of work. Do not proceed with installation until unsatisfactory conditions have been corrected. Starting of work will be construed as Contractor's acceptance of existing conditions and the Contractor will be responsible to correct and repair defects not reported to the Architect in writing at no additional cost.

3.02 PREPARATION

- A. Remove existing window assemblies and other associated work as indicated and required for the proper installation of new windows.

3.03 INSTALLATION

- A. Do not remove existing windows that are to be replaced until new replacement windows are available for installation. Do not leave any openings uncovered at end of working day.
- B. Remove all necessary portions of frame, sash members, or other existing materials that are required to be removed to permit the proper erection of new windows, trim, etc. Remove and replace deteriorated or damaged sills, blocking, etc. prior to covering or installing new windows, etc.
- C. Remove hardware, window shades, blinds, drapes, window air conditioners, exhaust vents, louvers, etc. as may be required to allow window replacement. Salvage or dispose of window treatments as directed by Owner.
- D. Install and/or reinstall window air conditioners, exhaust vents and louvers in insulated aluminum panels where indicated.

- E. Windows shall be installed and adjusted by experienced and qualified window erectors, and using only skilled window mechanics. Install windows in accordance with manufacturer's written instructions for installing windows, complete with all hardware, accessories, and other components Contract Drawings and approved shop drawings, at the proper elevation and location, plumb, level, and in alignment, rigidly secure and properly brace frames to prevent distortion and misalignment. Protect windows and operating parts against accumulation of cement, lime, and other building materials. Keep windows tightly closed.
- F. Anchor component parts securely in place to comply with performance requirements and permit movement where intended or necessary. Install slip-joint linings wherever possible to ensure movement as intended or necessary. In no case, shall any attachments to existing structure or to components of the window system be through or affect the thermal barriers of the windows.
- G. Provide all anchors, brackets, bolts, fasteners, treated wood blocking, furring, fillers, nailers, shims and inserts as required for a plumb and secure installation.
- H. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- I. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- J. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- K. Set all metal to metal joints between members of windows, frames, in a mastic sealant of type in conformance with AAMA/WDMA/CSA 101/I.S.2/A440 requirements. Remove excess mastic before it hardens.
- L. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/WDMA/CSA 101/I.S.2/A440.
- M. Apply bituminous coating of approximately 30 mil dry film thickness, or other suitable permanent separator, on concealed contact surfaces of dissimilar metals or cementitious materials, before assembly or installation, wherever there is the possibility of corrosive or electrolytic action.
- N. Wedge fiberglass insulation between frames of new windows and construction to remain or between frames and new blocking as applicable.
- O. Seal entire perimeter of window frames in wall openings to accomplish a watertight seal. Include both exterior and interior caulking.
- P. Seal joints between metal and all masonry surfaces, in addition to other areas as shown. Caulking to be tooled properly without ripples or omissions.
- Q. Color as selected by Architect.

3.04 ADJUST

- A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- B. Manufacturer shall clean all glass and aluminum prior to shipment.

- C. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system.

3.05 PROTECTION AND CLEANING

- A. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, labels, dirt and other substances. Lubricate hardware and moving parts.
- B. Clean glass of pre-glazed units promptly after installation of windows. Comply with manufacturer's written recommendations for final cleaning and maintenance.
- C. Screens shall be properly cleaned and free of any dirt, caulking, or other substances, etc.
- D. Contractor will clean premises of all refuse, debris, removed materials, etc., as soon as windows have been installed. Working areas to be left broom clean to Architect's satisfaction.
- E. Debris and/or removed materials shall not be allowed to accumulate.
- F. Initiate and maintain all protection and other precautions required to ensure that window units will be without damage or deterioration (other than normal weathering at time of acceptance).

END OF SECTION

SECTION 086300 - METAL FRAMED SKYLIGHTSH2M

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal framed Skylight System.
- B. Skylight glazing.
- C. Fasteners, anchors, reinforcement, and flashings.

1.02 REFERENCE STANDARDS

- A. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure; 2017.
- B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
- C. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
- E. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- F. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- G. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- I. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- J. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- K. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- L. ASTM C793 - Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants; 2023.
- M. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).
- N. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- O. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2018).
- P. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

- Q. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- R. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- S. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference; 2000 (Reapproved 2016).
- T. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007 (Reapproved 2016).

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide metal-framed skylights which have been manufactured, fabricated and installed to withstand loading required by the current edition of the International Building Code (IBC), New York State (ICC) Building Code, and as indicated on the drawings. Provide performance criteria required by these specifications without defects, damage, or failure.

1.04 SUBMITTALS

- A. See Section 013300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's specifications, standard details, and installation requirements. Include manufacturer's air and water resistance test reports showing compliance with requirements specified performance requirements.
- C. Shop Drawings: Indicate framed opening requirements and tolerances, spacing of members, anticipated deflection under load, affected related work, expansion and contraction joint locations and details, and sizes and locations for field welding. Include detailed plans, elevations, details of framing members, glazing infill materials, sealants, fasteners, anchors and thicknesses and types of formed flashing and closures and relationship with adjacent materials. Indicate maximum horizontal and vertical forces at rafter anchors.
 - 1. Show field measurements on shop drawings.
- D. Selection Samples: Submit full range of aluminum finish samples for Architect's color selection.
- E. Samples: Submit two samples, not less than 12 by 12 inch (300 by 300 mm) in size illustrating appearance of prefinished aluminum and specified glazing system, including glazed edge and corner. Submit standard sealant colors for selection and approval.
- F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- G. Installer Certificates: Provide certificate signed by manufacturer certifying that installers comply with requirements.
- H. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.
- I. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

SECTION 086300 - METAL FRAMED SKYLIGHTS

- J. Manufacturer's Installation Instructions: Indicate special procedures, safety precautions, and perimeter conditions requiring special attention.
- K. Field Quality Control Submittals: Report of field testing for water leakage.
- L. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.

1.05 QUALITY ASSURANCE

- A. Delegated Designer Qualifications: Design skylight system under direct supervision of a professional structural engineer experienced in design of work of the type specified in this section and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not fewer than ten (10) years of documented experience.
- C. Installer Qualifications: Company specializing in performing the type of work specified in this section with at least five (5) years of documented experience.
- D. Pre-installation Conference: When required, conduct conference at Project site to comply with requirements in Division 01 Section "Project Meetings." Review methods and procedures related to metal-framed skylights including, but not limited to, the following:
 - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - 2. Review structural load limitations.
 - 3. Review skylight curb structural requirements.
 - 4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 5. Review required field testing procedures.
 - 6. Review weather and forecasted weather conditions and procedures for unfavorable conditions.
 - 7. Review protection of adjacent roof areas.
 - 8. Review preparation and other requirements for installing structural silicone sealant.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide wrapping to protect prefinished aluminum surfaces. Do not use adhesive papers or spray coatings that bond when exposed to sunlight or weather.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Sequence deliveries to avoid delays, but minimize onsite storage.
- C. Storage and Protection: Store materials protected from exposure to harmful weather conditions, temperature and humidity conditions recommended by manufacturer. Protect materials from damage from sunlight, weather, excessive temperatures and construction operations.

1.07 FIELD CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by taking field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

- B. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Skylight System Warranty: Provide written warranty signed by manufacturer, agreeing to repair or replace work which exhibits failure of systems to meet performance requirements, defects in materials or workmanship and guaranteeing weathertight and leak free performance for a period of five (5) years from the completion date of the installation. "Defects" are defined to include, but are not limited to, uncontrolled leakage of water, abnormal aging or deterioration
- C. Correct defective work, including leaks, discoloration, failure of seal at insulated glazing units, and excessive thermal or structural movement, within a five (5) year period after Date of Substantial Completion.
- D. Finish Warranty: Provide written warranty signed by manufacturer, agreeing to repair or replace work which exhibits defects in finish. For painted finishes, defects shall include peeling, chipping, chalking or fading.
 - 1. Warranty Period for Anodized Finish: ten (10) years from date of application for film integrity.
 - 2. Warranty Period for Baked Enamel Finish: five (5) year from date of application for film integrity.
 - 3. Warranty Period for Fluoropolymer (PVDF) AAMA 2604 Finish: ten (10) years from date of application for color and film integrity.
 - 4. Warranty Period for Fluoropolymer (PVDF 70%) AAMA 2605 Finish: twenty (20) years from date of application for color and film integrity.
- E. Glazing Infill Warranty: Provide written warranty signed by glass (or metal panel) fabricator agreeing to repair or replace glazing materials which exhibit defects in materials or workmanship. "Defects" are defined to include delamination, failure of the hermetically sealed airspace or deterioration of coatings.
 - 1. Warranty Period: five (5) years from date of manufacture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal-Framed Skylights:
 - 1. Wasco, part of the VELUX Group: Pinnacle 600 SPG system. (Basis of Design)
 - a. Address: Wells, ME 04090 (800-388-0293)
 - 2. Oldcastle Building Envelope; BMS-3000 Sloped Glazing System.
 - a. Address: 803 Airport Road, Terrell, Texas 75160; Telephone: (800) 527-4018, (972) 551-6400; Fax (972) 551-6420; Email: www.oldcastlebe.com.
 - 3. Super Sky Products Enterprises, LLC: www.supersky.com.
 - 4. Architect approved equivalent.
 - 5. Substitutions: See Section 016100 - Product Requirements and Section 012500 - Product Substitution Procedures.

2.02 METAL-FRAMED SKYLIGHTS

- A. Metal Framed Skylights: Factory-fabricated, glazed.

SECTION 086300 - METAL FRAMED SKYLIGHTSH2M

1. Frame: Extruded aluminum structural members with integral condensation collection and guttering system, 6063-T6 with temper and alloy as recommended by the manufacturer for design loading, cross-sectional configuration, fabrication requirements and required finish.
 - a. Framing members: 2 3/4 inches wide by 6 inches deep or as required to meet loading requirements.
 - b. Configuration: Pyramid
 - c. Formed flashing and closures: minimum 0.062 inch thick aluminum sheet.
 - d. Condensation and Water Infiltration Control: Provide framing system which will collect and channel condensation and water infiltration to the exterior through baffled weep holes or drain tubes in the sill or perimeter framing members.
 - e. Fabricate work to be straight, plumb, level and square. Provide work to sizes, shapes and profiles indicated on approved shop drawings. Make work with uniform, tight joints.
 - f. Use factory-performed heliarc welding with all exposed welds finished to match adjacent material.
 2. Light Transmission: 32 percent.
 3. Aluminum Finish: Superior performing organic coatings.
 - a. Color: as selected by the architect from the manufacturer's full color offering.
 4. Fabricate to prevent harmonic vibration, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.
- B. Performance Requirements: Provide products that comply with the following:
1. Structural Design: Design and size components to withstand dead loads and specified live loads without damage or permanent set.
 2. Wind Loads: Test in accordance with ASTM E330/E330M, using loads 1.5 times the specified design pressures and 10 second duration of maximum load.
 3. Design Pressure (DP): In accordance with applicable codes.
 4. Snow Load: 30 psf (1436 Pa).
 5. Concentrated Load: Design to withstand 250 lb (114 kg) concentrated load at any location on framing members without permanent set.
 6. Glazing Support Member Deflection Under Wind Load: 1/180 of span, maximum.
 7. Thermal Movement: Design system to accommodate thermal expansion and contraction over ambient temperature range of 100 degrees F (38 degrees C), dynamic loading and release of loads, and deflection of structural support framing without damage to skylight system components or loss of weathertightness.
 8. Air Leakage: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft (0.3 L/s/sq m) for glazed area, measured at a reference differential pressure across assembly of 6.24 psf (300 Pa) in accordance with ASTM E283.
 9. Water Leakage: None, when measured in accordance with ASTM E331 at a test pressure difference of 12 lbf/sq ft (575 Pa).

2.03 MATERIALS

- A. Aluminum Extrusions: Alloy and temper 6063-T6 members complying with ASTM B221 (ASTM B221M), with minimum thickness 0.125 (3.2 mm) for structural members and 0.090 (2.3 mm) for non-structural members.
1. Color: As selected by the Architect from the manufacturer's full color offering.
- B. Insulated Laminated Coated Glass: 1 5/16 inches sealed insulated units, outer pane of tinted transparent, tempered glass; inner pane of clear transparent, laminated glass; space of sealed argon gas, warm metal edge spacer frame by Vitro or Architect approved equivalent.
1. Exterior Glass Ply: 1/4 inch (6mm) Solarban z50 on Optiblue Tempered with Low E coating of Solarban z50 on #2 surface.
 2. Spacer: 1/2 inch mill finish aluminum warm edge spacer.

SECTION 086300 - METAL FRAMED SKYLIGHTSH2M

3. Silicone sealer: Black
 4. Interior Glass Ply: Laminated Glass
 - a. Laminated Outer Glass layer: 1/4 inch (6mm) Clear
 - b. Interlayer: 0.060 inch PVB Clear
 - c. Laminated inner Glass Layer: 1/4 inch (6mm) Clear.
 5. Performance Requirements:
 - a. Visible Light Transmittance (VLT): 51%
 - b. Winter U-Value: 0.24
 - c. Summer U-Value: 0.29
 - d. Shading Coefficient: 0.28
 - e. Solar Heat Gain Coefficient (SHGC): 0.32
- C. Glazing Accessories: Spacers, Edge Blocks, and Setting Blocks: Manufacturer's standard permanent non-migrating type of elastomer type and hardness selected to comply with requirements. Spacers, Edge Blocks, and Setting Blocks to be extruded thermoplastic elastomer by the skylight manufacturer.
- D. Weatherseal Sealant: Low VOC (8.1 g/L or less), 100% Silicone, with adhesion in compliance with ASTM C794; Color shall match the exterior frame or as selected by the architect.
- E. Protective Back Coating: Asphaltic mastic, ASTM D4479/D4479M, Type I.
- F. Fasteners: 18-8 Stainless steel
- G. Flashing: Matching finish of skylight frame system components; secure using concealed fastening method, and seal with weather sealing type sealant.
 1. Apron Flashing: Aluminum sheet alloy and temper of 1100-H14, 11 gauge, 0.090 inch (2.3 mm) minimum thickness.
 2. Closures: Aluminum sheet alloy and temper of 1100-H14, 20 gauge, 0.032 inch (.81 mm) minimum thickness
- H. Anchorage Devices: Type recommended by manufacturer, concealed.

2.04 FABRICATION

- A. Rigidly fit and secure joints and corners with screw and spline. Make joints rigid, with connections that are flush, hairline, and weatherproof.
- B. Fabricate components to allow for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly.
- C. Maintain continuous air and vapor barrier throughout assembly, with the barrier plane aligned with inside pane of glazing continuing to a heel bead of glazing sealant.
- D. Drain to exterior any water entering exterior joints, condensation occurring in glazing channels, or migrating moisture occurring within system.
- E. Prepare components to receive concealed anchorage devices. Ensure that fasteners and anchorage devices will be concealed upon completion of installation.

2.05 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick; exterior surfaces only.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect area to receive skylight to ensure that all conditions are in accordance with specification sheets and approved shop drawings
- B. Verify that structural curb is ready to receive skylight system. Coordinate installation of roofing, flashing and other adjacent work to ensure weathertight construction.
- C. Inspect material upon arrival at the job site for condition and that the quantity of material is in agreement with the packing slip.

3.02 PREPARATION

- A. Apply 1 coat of protective coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

3.03 INSTALLATION

- A. Install metal-framed skylights in accordance with manufacturer's instructions.
- B. Set skylight structure plumb, level, and true to line, without warp or rack of frames or glazing panels. Anchor securely in place in accordance with approved shop drawings.
- C. Maintain assembly dimensional tolerances, aligning with adjacent work.
- D. Install base flashings in accordance with Section 076200.
- E. Pack fibrous insulation in shim spaces at perimeter of assembly to ensure continuity of thermal barrier.
- F. Install glazing in accordance with Section 088000.
- G. Touch up damaged finishes so repair is imperceptible from 6 feet (2 meters). Remove and replace components that cannot be satisfactorily touched up.

3.04 TOLERANCES

- A. Maximum Variation from Plumb, Level, or Line: 1/8 inch per 10 feet (1 mm per 1 m), or 3/8 inch (9.5 mm) total in overall dimension.
- B. Alignment of Two Adjoining Members Abutting in Plane: Within 1/16 inches (1.6 mm).

3.05 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.
- B. See Section 014000 - Quality Requirements, for general requirements for testing and inspection.
- C. Test installed skylight for water leakage in accordance with AAMA 501.2.

SECTION 086300 - METAL FRAMED SKYLIGHTS **H2M**

3.06 CLEANING

- A. Upon completion of installation, thoroughly clean skylight aluminum surfaces in accordance with AAMA 609 & 610.
- B. Remove protective material from prefinished aluminum surfaces.
- C. Wash down exposed surfaces; wipe surfaces clean.
- D. The contractor shall exercise caution to prevent alkaline substances, paint, acid, abrasive, or other substances or objects from damaging the skylight finishes or glazing systems during and after the skylight installation. In the event skylight is damaged after the installation, the general contractor shall be responsible to correct any damage to the satisfaction of the Owner, including replacement of the skylight unit.
- E. Remove excess sealant by methods recommended by skylight manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Flush Wood Doors"
 - c. "Stile and Rail Wood Doors"
 - d. "Interior Aluminum Doors and Frames"
 - e. "Aluminum-Framed Entrances and Storefronts"
 - f. "Special Function Doors"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature

4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:

- a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
5. Key Schedule:
- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
- C. Informational Submittals:
1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
 2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.
- D. Closeout Submittals:
1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule

- e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
- f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

- 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Fire door assemblies, in compliance with NFPA 80.
 - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

- 1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
- 2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
- 3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
- 4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

- 1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- 2. Smoke and Draft Control Door Assemblies:
 - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105

- b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
- 3. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- 4. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

- 1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
- 2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
- 3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:

- a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
 7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
 8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
 9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage ND series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.

2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
 - a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
 - b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
 - c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
 - d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
 - e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
3. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.

2.06 ELECTRONIC ACCESS CONTROL WIRELESS CYLINDRICAL LOCK

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Schlage NDEB series

B. Requirements:

1. ANSI/BHMA A156.2 Series 4000, Grade 1.
2. Florida Building Code (ASTM E330, E1886, E1996) and Miami Dade (TAS 201, 202, 203) requirements for hurricanes.
3. Certified to UL10C 3-hour rating, ULC-S319, FCC Part15, ADA RoHS, ICC ANSI A117.1
4. Listed, UL 294 - The Standard of Safety for Access Control System Units.
5. Compliant with ANSI/BHMA A156.25 Operation and Security interior operating range of 32 degrees F (0 degrees C) to 120 degrees F (49 degrees C) for interior use only.
6. Compliant with ASTM E330 for door assemblies.
7. Compliant with ICC / ANSI A117.1, NFPA 101, NFPA 80 and IBC Chapter 10 Cylinders: Refer to "KEYING" article, herein.
8. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
 - a. Abusive Locked Lever Torque Test – minimum 3,100 inch-pounds without gaining access
 - b. Offset lever pull – minimum 1,600-foot pounds without gaining access
 - c. Vertical lever impact – minimum 100 impacts without gaining access
 - d. Cycle Test - tested to minimum 16 million cycles with no visible lever sag or use of performance aids such as set screws or spacers.
9. Emergency Override: Provide mechanical key override; cylinders: Refer to "KEYING" article, herein.
10. Levers:

- a. Provide lever trim that operates independently of each other and is field reversible without tools.
- 11. Power Supply: 4 AA batteries
 - a. Provide battery powered wireless electronic products with the ability to communicate battery status and battery voltage level by means of a mobile app at door and remotely by Partner integrated software.
- 12. Features:
 - a. Ability to communicate unit's communication status.
 - b. Visual LED indicators that indicate activation, operational systems status, system error conditions and low power conditions.
 - c. Audible feedback that can be enabled or disabled.
 - d. Suitable for both interior and exterior deployment.
 - e. Employ Wi-Fi communications to permit remote view of audits and alerts, as well as provide automatic daily updates to lock configuration and user access rights.
- 13. Adaptability:
 - a. Open Architecture: Provide locksets manufactured with open architecture characteristics capable of handling new and existing access control software and credential reading technology. Can be supported by cloud-based web and mobile apps without the need for an integrated software partner.
- 14. Switches:
 - a. Door Position Sensor – magnet integrated into strike to eliminate additional door prep
 - b. Interior Cover Tamper Guard
 - c. Battery Status
 - d. Request to Exit
 - e. Interior Push Button
- 15. Credentials: Provide integral credential reader modules in the following configurations:
 - a. NFC, including peer-peer compatible, operable with both Android and IOS mobile devices
 - b. 125 kHz contactless smart cards
 - 1) Compatibility: Schlage, XceedID, ISONAS, HID, GE/CASI, AWID
 - c. 13.56 MHz contactless smart cards
 - 1) Secure section (multi-technology and smart card) compatibility: Schlage MIFARE Classic, Schlage MIFARE DESFire EV1/EV3
 - 2) 13.56 MHz Serial number only (multi-technology and smart card) compatibility: DESFire CSN, HID iCLASS CSN, MIFARE CSN, MIFARE DESFire EV1/EV3 CSN
 - d. Multi-technology contactless for applications requiring read capability for both 125 kHz proximity and 13.56 MHz contactless smart cards.
 - e. BLE
- 16. Records: Subject to the limitations of the attached access control system, the wireless locks possess enough storage capacity to support 5000 users and 2000 audits.
- 17. Verification time: less than or equal to 1 second for smart cards and proximity cards
- 18. Coordinate with Division 01 and 281300 Access Control.

2.07 ELECTRIC STRIKES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Von Duprin 6000 Series

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.08 KEYSWITCHES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage 650 series

B. Requirements:

1. Provide key switches capable of being configured to momentary or maintained action.
2. Provide key switches that accept a mortise cylinder. Cylinders: Refer to "KEYING" article, herein.

2.09 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage Everest 29 T

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Patented Restricted: cylinder with interchangeable core with patented, restricted keyway.
3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.10 KEYING

A. Scheduled System:

1. Existing factory registered system:
 - a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - e. Quantity: Furnish in the following quantities.
 - 1) Permanent Control Keys: 3.
 - 2) Master Keys: 6.
 - 3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
 - 4) Key Blanks: Quantity as determined in the keying meeting.

2.11 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Telkee

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.12 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4040XP series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

2.13 ELECTROMECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN Senior Swing

B. Requirements:

1. Provide low energy automatic operator units that are electromechanical design complying with ANSI/BHMA A156.19.
 - a. Opening: Powered by DC motor working through reduction gears.
 - b. Closing: Spring force.
 - c. Manual, hydraulic, or chain drive closers: Not permitted.
 - d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
 - e. Cover: Aluminum.
2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 1 to 32 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, and adapters for arms as required to suit details.
4. Provide motion sensors and/or actuator switches, and receivers for operation as specified. Provide weather-resistant actuators at exterior applications.

5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

2.14 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.15 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
 - a. Glynn-Johnson

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.16 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.17 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.18 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
 - 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

- M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- P. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

Abbreviation	Name
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

116250 OPT0382369 Version 1

Hardware Group No. 00

For use on Door #(s):

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
EA	OPENING	REMOVED FROM SCOPE		

Hardware Group No. 01

For use on Door #(s):








Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3 EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1 EA	CLASSROOM LOCK	ND70TD ATH	626	SCH
1 EA	FSIC CORE	23-030 EV29 T	626	SCH
1 EA	SURFACE CLOSER	4040XP CUSH	689	LCN
1 EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1 EA	GASKETING	488SBK PSA	BK	ZER

Hardware Group No. 01-1

For use on Door #(s):









Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	CLASSROOM LOCK	ND70TD ATH		626	SCH
1	EA	FSIC CORE	23-030 EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 01-2

For use on Door #(s):

Provide each SGL door(s) with the following:








QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	CLASSROOM LOCK	ND70TD ATH		626	SCH
1	EA	FSIC CORE	23-030 EV29 T		626	SCH
1	EA	OH STOP	90S		689	GLY
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	MOUNTING PLATE	4040XP-18 SRT		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

A CONFLICT MAY OCCUR BETWEEN THE GJ O/H STOP AND THE CLOSER BODY, THE DROP PLATE MAY NEED TO BE DRILLED OUT TO ALLOW THE THRU-BOLTS OF THE O/H STOP TO BE INSTALLED.

Hardware Group No. 02

For use on Door #(s):

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	STOREROOM LOCK	ND80TD ATH		626	SCH
1	EA	FSIC CORE	23-030 EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER





SECTION 087100 - DOOR HARDWARE

H2M

Hardware Group No. 03

For use on Door #(s):





Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PASSAGE SET	ND10S ATH		626	SCH
1	EA	WALL STOP	WS406/407CCV		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 03-1

For use on Door #(s):








Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PASSAGE SET	ND10S ATH		626	SCH
1	EA	OH STOP	90S		689	GLY
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 04

For use on Door #(s):







Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	PRIVACY LOCK W/ OUTSIDE INDICATOR	ND40S ATH OS-OCC		626	SCH
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 05

For use on Door #(s):










Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	STOREROOM LOCK	ND80TD ATH		626	SCH
			TO BE LOCKED FROM INTERIOR SIDE			
1	EA	FSIC CORE	23-030 EV29 T		626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	566A		A	ZER
1	EA	WEATHER SEALS	BY DOOR/FRAME MANUFACTURER			

Hardware Group No. 06

For use on Door #(s):

Provide each SGL door(s) with the following:












QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	PASSAGE SET	ND10S ATH		626	SCH
1	EA	ELECTRIC STRIKE	4211 FSE 12/24 VDC		✓ 630	VON
1	EA	SURF. AUTO OPERATOR	9542 MS AS REQ (120/240 VAC)		✓ ANCLR	LCN
2	EA	ACTUATOR, TOUCH	8310-853T		✓ 630	LCN
			ACTIVE LOGO TO BE USED			
2	EA	MOUNT BOX	8310-867F			LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. DOOR CAN BE MANUALLY OPENED OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS ELECTRIC STRIKE TO RELEASE AND AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT.

Hardware Group No. 06-1

For use on Door #(s):

Provide each SGL door(s) with the following:









QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	CLASSROOM LOCK	ND70TD ATH		626	SCH
1	EA	CYLINDER	AS REQUIRED		626	
2	EA	FSIC CORE	23-030 EV29 T		626	SCH
1	EA	ELECTRIC STRIKE	4211 FSE 12/24 VDC		✓ 630	VON
1	EA	SURF. AUTO OPERATOR	9542 MS AS REQ (120/240 VAC)		✓ ANCLR	LCN
2	EA	ACTUATOR, TOUCH	8310-853T		✓ 630	LCN
		ACTIVE LOGO TO BE USED				
2	EA	MOUNT BOX	8310-867F			LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	KEY SWITCH	653-04 L2 12/24 VDC		✓ 630	SCE
		LOCATED INSIDE CLASSROOM				

OPERATIONAL DESCRIPTION: IMMEDIATE EGRESS ALWAYS ALLOWED. DOOR NORMALLY UNLOCKED. ACCESS BY KEY WHEN LOCKED. ACTUATOR RELEASES ELECTRIC STRIKE AND ENABLES EXTERIOR ACTUATOR. DOOR CAN BE MANUALLY PULLED OPEN OR AUTOMATICALLY OPERATED BY PUSHING ACTUATOR WHICH SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR. INTERIOR ACTUATOR TO RELEASE ELECTRIC STRIKE AND SIGNAL AUTOMATIC OPERATOR TO OPEN DOOR. LOCATE ACTUATORS AS DIRECTED BY ARCHITECT. IN LOCKDOWN SITUATION, KEYSWITCH TO BE USED TO DEACTIVATE ACTUATOR.

Hardware Group No. CR01

For use on Door #(s):

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	WIRELESS ELECTRONIC LOCK	NDEBT ATH BATTERY OPERATED		✓ 626	SCE
1	EA	FSIC CORE	23-030 EV29 T		626	SCH
1	EA	OH STOP	90S		689	GLY
1	EA	SURFACE CLOSER	4040XP		689	LCN
1	EA	MOUNTING PLATE	4040XP-18 SRT		689	LCN
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	566A		A	ZER
1	EA	WEATHER SEALS	BY DOOR/FRAME MANUFACTURER			

A CONFLICT MAY OCCUR BETWEEN THE GJ O/H STOP AND THE CLOSER BODY, THE DROP PLATE MAY NEED TO BE DRILLED OUT TO ALLOW THE THRU-BOLTS OF THE O/H STOP TO BE INSTALLED.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. 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. Door and Window glazing.

1.03 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.
- C. Interspace: Space between lites of an insulating-glass unit.
- D. Sealed Insulating Glass Unit Surface Designations:
 - 1. Surface #1 - Exterior surface of the outer glass lite
 - 2. Surface #2 - Interspace surface of the outer glass lite
 - 3. Surface #3 - Interspace surface of the inner glass lite
 - 4. Surface #4 - Interior surface of the inner glass lite or the interlayer surface of the first layer of laminated glass.
 - 5. Surface #5 - Interlayer surface of the second layer of laminated glass.
 - 6. Surface #6 - Interior surface of the second layer of laminated glass.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:
 - 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Wind Design Data: As indicated on Drawings.
 - b. Basic Wind Speed: 135 mph.
 - c. Risk Category: III.
 - 2. Design Snow Loads: As indicated on Drawings.
 - 3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 - 4. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.05 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glass Samples: For each type; 12 inches (300 mm) square.
 - 1. Fire-resistive glazing products.
 - 2. Insulating glass.
- C. Glazing Accessory Samples: For gaskets sealants and colored spacers, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers manufacturers of insulating-glass units with sputter-coated, low-e coatings glass testing agency and sealant testing agency.
- B. Product Certificates: For glass and glazing products, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for tinted glass coated glass insulating glass glazing sealants and glazing gaskets.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Warranties: Sample of special warranties.

1.07 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: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
- E. Source Limitations for Glass: Obtain tinted float glass coated float glass laminated glass and insulating glass from single source from single manufacturer for each glass type.
- F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

- G. 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. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- I. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (232 deg C), and the fire-resistance rating in minutes. Fire resistance rated assemblies must be tested in accordance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
- J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.09 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 glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 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: Ten (10) years from date of Substantial Completion.

- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
1. Warranty Period: Ten (10) years from date of Substantial Completion.
- C. 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: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced-protection testing requirements in ASTM E1996 for Wind Zone 1 when tested according to ASTM E1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.
1. Large-Missile Test: For all glazing, regardless of height above grade.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.02 GLASS PRODUCTS

- A. Heat-Treated Float Glass: ASTM C1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of 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 coated glass).
- B. Pyrolytic-Coated, Self-Cleaning, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.
 - 1. Products <<http://www.specagent.com/LookUp/?ulid=166&mf=04&src=wd>>: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cardinal Glass Industries; LoE2 Plus
 - b. Pilkington North America; Activ
 - c. PPG Industries, Inc.; SunClean
- C. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Solargray by PPG Industries or comparable product by one of the following:
 - a. EFCO.
 - b. Guardian Industries.
 - 2. Tint Color: StarPhire.
 - 3. Visible Light Transmittance: 76 for Clear glazing and 54 for Gray Tinted glazing percent minimum.
- D. Spandrel Glass: ICD OPACI-COAT-300 Silicone Opacifier coating: ASTM C1048, Kind FT, Condition B, Type I, Quality-Q3, and complying with other requirements specified.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Vitro Architectural Glass or comparable product by one of the following:
 - 2. Guardian Glass Products.
 - 3. Pilkington North America.
 - 4. Spandrel Coating Color: As selected by the Architect.

2.03 LAMINATED GLASS

- A. Laminated Glass: ASTM C1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.
- B. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with the following to comply with interlayer manufacturer's written recommendations:

- a. Polyvinyl butyral interlayer.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 3. Interlayer Color: Clear unless otherwise indicated.
- C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.04 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190, and complying with other requirements specified.
1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
 2. Spacer: Manufacturer's standard spacer material and construction.
 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- B. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.

2.05 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies.
- B. Multi-laminate Fire-Rated (45 to 120 minutes), Impact Safety-Rated Fireglass multi-laminate glass with clear intumescent interlayers, interior and exterior use, meets CPSC 16 CFR 1201 (Cat. I and II) and ANSI Z97.1 and providing protection against radiant and conductive heat transfer as per ASTM E119 and UL 263, withstands thermal shock. 5-year limited warranty. .
1. Products : Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pilkington Pyrostop: 45-200: 45 min., 3/4 inch thick, STC 40, U-Value - .86
 - b. or approved equal

2.06 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
1. Neoprene complying with ASTM C864.
 2. EPDM complying with ASTM C864.
 3. Silicone complying with ASTM C1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM gaskets complying with ASTM C509, Type II, black; of profile and hardness required to maintain watertight seal.
1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.07 GLAZING SEALANTS

- A. General:

1. Compatibility: Provide 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. Sealants used inside the weatherproofing system 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."
 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700
 - c. Pecora Corporation; 890
 - d. Sika Corporation, Construction Products Division; SikaSil-C990
 - e. Tremco Incorporated; Spectrem 1
- C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.08 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.09 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 of 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 C1330, 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: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

2.11 MONOLITHIC-GLASS TYPES

- A. Glass Type MG-1 Clear fully tempered float glass.
 - 1. Thickness: 1/4 inch (6.0 mm) as indicated on the drawings.
 - 2. Provide safety glazing labeling.
- B. Glass Type MG-: Polished wired glass.
 - 1. Thickness: 8.0 mm.
 - 2. Square (Baroque) wire pattern with applied 7 mil safety film.
 - 3. Weight: 3.0 lbs. / sq. ft.
 - 4. STC Rating: STC 28
 - 5. Manufacturer: SafliFirst "Superl-W " or Architect approved equivalent.
 - 6. CSPC 16 CFR 1201 Cat. I and II.
- C. Glass Type MG-:
 - 1. Thickness: 1/2 inch.
 - 2. Mar/UV resistant Lexan MR10 Polycarbonate Glazing with Margard II Coating.
 - 3. Manufacturer: SABIC GLOBAL TECHNOLOGIES.
 - 4. 10-year warranty.
 - 5. Dade County approved.
 - 6. Temperature Range: -40 degrees F to 180 degrees F.

2.12 INTERIOR LAMINATED-GLASS TYPES

- A. Glass Type ILG-1: Clear laminated glass with two plies of fully tempered float glass with etched surface pattern.
 - 1. Thickness of Each Glass Ply: 0.118 inch (3.0 mm).
 - 2. Interlayer Thickness: 0.090 inch (2.29 mm).
 - 3. Provide safety glazing labeling.

4. Provide acid-etched banding as indicated on the drawings.
- B. Glass Type ILG-2: Fire-rated laminated glass
1. Thickness: 8.0 mm.
 2. Provide safety glazing label- CSPC 16 CFR 1201 Cat. I and II.
 3. Manufacturer: TGP Firelite Plus; McGrory Glass Pyran Platinum L or Architect approved equivalent.

2.13 INSULATING GLASS TYPES

- A. Interior Glass Type IIG-1: insulating glass.
1. Overall Unit Thickness: 1 inch.
 2. Exterior Glass Lite: 1/4 inch tempered StarPhire glass.
 3. Interspace Content: Air (12%) / Argon (22%) / Krypton (66%) Mix.
 4. Interspace Gap Size: 1/2 inch
 5. Interior Glass Lite: 1/4 inch tempered StarPhire glass.
- B. Exterior Glass Type EIG-1: Low-E coated, insulating glass.
1. Overall Unit Thickness: 1 inch.
 2. Exterior Glass Lite: 1/4 inch tempered Guardian SuperNeutral SNX 62/27 Low-E (2) Crystal Gray glass.
 3. Interspace Content: Air (12%) / Argon (22%) / Krypton (66%) Mix.
 4. Interspace Gap Size: 1/2 inch
 5. Indoor Glass Lite: 1/4 inch tempered StarPhire glass
 6. Visible Light Transmittance: 44 percent minimum.
 7. Winter Nighttime U-Factor: 0.24 maximum.
 8. Solar Heat Gain Coefficient: 0.21 maximum.
- C. Glass Type EIG-2: Spandrel Glass - ICD OPACI-COAT-300 Silicone Opacifier coating, Low-E, insulating spandrel glass.
1. Overall Unit Thickness: 1 inch.
 2. Thickness of Exterior Glass Lite: 1/4 inch fully tempered Solarban 60 (2) SolarGray glass.
 3. Interspace Content: Air (12%) / Argon (22%) / Krypton (66%) Mix.
 4. Interspace Gap Size: 1/2 inch
 5. Indoor Lite: 1/4 inch fully tempered Clear with ICD OPACI-COAT-300 Silicone Opacifier coating (4).
 6. Opacifier Color: ICD 3-4094 - Graylights or as selected by the Architect to match glazing system.
 7. Winter Nighttime U-Factor: 0.24 maximum.

2.14 EXTERIOR LAMINATED INSULATING GLASS TYPES

- A. Glass Type ELIG-: Low-e-coated, insulating glass.
1. Overall Unit Thickness: 1.31 (with 0.060 PVB interlayer - 1/4" glass).
 2. Exterior Glass Lite: 1/4 inch tempered Guardian SuperNeutral SN68 Low-E (2) Crystal Gray glass.
 3. Interspace Content: Air (12%) / Argon (22%) / Krypton (66%) Mix.
 4. Interspace Gap Size: 1/2 inch
 5. Indoor Glass Lite: 1/4 inch heat strengthened Clear - 0.060 inch Clear PVB - 1/4 inch heat strengthened Clear.
 6. Visible Light Transmittance: 35 percent minimum.
 7. Winter Nighttime U-Factor: 0.24 maximum.
 8. Solar Heat Gain Coefficient: 0.25 maximum.
 9. Provide safety glazing labeling.

- B. Glass Type ELSG-: Spandrel Glass; Low-E, insulating spandrel glass.
 - 1. Overall Unit Thickness: 1.31 (with 0.060 PVB interlayer).
 - 2. Exterior Glass Lite: 1/4 inch fully tempered float glass, Solarban 60 Low-E(2) SolarGray.
 - 3. Interspace Content: Air (12%) / Argon (22%) / Krypton (66%) Mix.
 - 4. Interspace Gap Size: 1/2 inch
 - 5. Indoor Lite: 1/4 inch heat strengthened Clear with 0.060 clear PVB on 1/4 inch heat strengthened with Ceramic-Coated Spandrel Glass
 - 6. Ceramic Frit Color: Warm Gray
 - 7. Winter Nighttime U-Factor: 0.29 maximum.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.03 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. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- 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 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 (1270 mm).
 - 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 (3-mm) 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.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 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 right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket 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. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.06 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.

3.07 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 non-permanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing 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.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Extruded aluminum architectural louvers.
 - 2. Extruded aluminum brick vent(s).
 - 3. Blank-off panels for louvers.
 - 4. Snow Stopper Screens
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 042113 - Brick Masonry
 - 2. Section 042200 - Concrete Unit Masonry
 - 3. Section 079200 - Sealants
 - 4. Division 23 - Heating, Ventilating and Air Conditioning

1.03 STANDARDS AND REFERENCES

- A. All work of this section shall conform to industry latest standards and/or manufacturer's recommendations.
- B. AMCA Publication 511 "Certified Ratings Program - Product Rating Manual for Air Control Devices".
- C. AMCA Standard 500-L "Laboratory Methods of Testing Louvers for Ratings".
- D. AMCA 501 "Application Manual for Air Louvers".
- E. AMCA 512 "AMCA Listing Label Program Water and Air Certification".
- F. AMCA Standard 540 "Test Method for Louvers Impacted by Wind Borne Debris".
- G. AAMA "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum".
- H. ASTM B 209 "Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate".

1.04 DEFINITIONS

- A. AMCA: Air Movement and Control Association International, Inc.
- B. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- C. Standard Free Area: Free area of a louver 48 inches (1220 mm) wide by 48 inches (1220 mm) high, identical to that provided.
- D. Maximum Standard Airflow: Airflow at point of beginning water penetration through a louver 48 inches (1220 mm) wide by 48 inches (1220 mm) high, identical to that provided.
- E. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).

- F. Vertical Louver: Louver with vertical blades (i.e., the axis of the blades are vertical).
- G. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- H. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven-rain performance, as determined by testing according to AMCA 500-L.
- I. Windborne-Debris-Impact-resistant Louver: Louver that provides specified windborne-debris-impact resistance, as determined by testing according to AMCA 540.

1.05 SUBMITTALS

- A. Submit pursuant to Section 013300 - Submittal Procedures.
- B. Submit pursuant to Section 016000 - Product Requirements.
- C. Sustainable Documentation Submittals: LEED Rating System.
 - 1. Certificates for Credit EA 1 - Optimize Energy Performance: Design the building envelope and building systems to maximize energy performance.
 - a. Provide certificate verifying louver water infiltration and ventilation performance to verify design assumptions and calculations.
 - 2. Certificates for Credit MR 4 - Recycled Content: Increase demand for building products that incorporate recycled content materials, therefore reducing impacts resulting from extraction and processing of new virgin materials.
 - a. Percentage of recycled content showing cost and percentage(s) of post-consumer and/or post-industrial content, and the total cost of materials for the louver.
 - 3. Credit MR 5.1: Provide product data indicating location of material manufacturer for regionally manufactured materials.
 - a. Include statement indicating cost and distance from manufacturer to Project for each regionally manufactured material.
 - b. Include a statement indicating cost and distance from point of extraction, harvest, or recovery to project for each raw material used in regionally manufactured materials.
- D. Manufacturer's product data illustrating and describing materials, components, hardware, and installation methods.
 - 1. Submit free area, air performance, and water penetration ratings determined in accordance with AMCA Standard 500-L and licensed under the AMCA Certified Ratings Program for each different model and size louver.
 - 2. Cleaning Methods.
- E. Shop drawings, including but not limited to, plans, elevations, sections and details showing profiles, angles and spacing of louver blades and frames, unit dimensions related to wall openings and construction, details of connecting, mounting, anchoring, and assembling.
- F. Selection Samples: Two complete color charts showing the full range of colors available in the finish specified for units with factory-applied color finishes.
- G. Samples for Verification: For each finish specified, three (3) samples representing actual finishes specified; prepared on samples of same thickness and material indicated for final Work. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
- H. Product Certificates:

1. Air Performance: Certificates signed by Air Movement and Control Association International Inc (AMCA) certifying that the manufacturer's stock units are tested in accordance with AMCA Standard 500 and are licensed to bear the AMCA Certified Ratings Seal in accordance with AMCA Standard 511.
2. Water Penetration: Certificates signed by Air Movement and Control Association International Inc (AMCA) certifying that the manufacturer's stock units are tested in accordance with AMCA Standard 500 and are licensed to bear the AMCA Certified Ratings Seal in accordance with AMCA Standard 511.
3. Weather Louver Effectiveness: Certificates signed by Air Movement and Control Association International Inc (AMCA) certifying that the manufacturer's stock units are tested in accordance with AMCA Standard 500-L99, Section 8.3.2 - Wind Driven Rain Water Penetration Test, and are licensed to bear the AMCA Certified Ratings Seal in accordance with AMCA Standard 511.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 10 years manufacturing similar products. The manufacturer shall have implemented a program for the management of quality objectives, continual improvement, and monitoring of customer satisfaction to assure that customer needs and expectations are met.
- B. Source Limitations: Obtain products through one source from a single manufacturer where alike in one or more respects regarding type, design, or factory-applied color finish.
- C. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.
- B. Store products indoors in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.
- C. Handling: Protect materials and finishes during handling and installation to prevent damage.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements, as shown on Contract Documents, before installation.

1.09 PROJECT CONDITIONS

- A. Coordinate installation of louvers with mechanical ducts and flues, if any, connected to the louver.

1.10 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty for louver systems for a period of 1 year from date of Substantial Completion. When notified in writing from the Owner of a manufacturing defect, manufacturer shall promptly correct deficiencies without cost to the Owner.
- B. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 1. 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.
- d. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering louvers that may be incorporated into the Work include, but are not limited to, the following:
1. The Airolite Company, P.O. Box 410, Schofield, WI 54476, Phone: (715) 841-8759 (Basis of Design).
 2. Arrow United Industries, 450 Riverside Drive, Wyalusing, PA 18853, Phone: (570) 746-1888.
 3. Greenheck, P.O. Box 410, Schofield, WI 54476, Phone: (715) 359-6171.
 4. Ruskin Company; 3900 Dr. Greaves Road, Kansas City, Missouri 64030. Tel: (816) 761-7476.

2.02 LOUVERS - GENERAL

- A. Performance Requirements:
1. Structural Performance: Provide products capable of withstanding the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of components including blades, frames, and supports; noise or metal fatigue caused by component rattle or flutter; or permanent damage to fasteners and anchors.
 - a. Temperature Change (Range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.
- B. Fabrication:
1. Assemble units in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
 2. Maintain equal louver blade spacing to produce uniform appearance.
 3. Fabricate frames, including integral sills for louvers, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining materials' tolerances, and perimeter sealant joints.
 4. Include supports, anchorages, and accessories required for complete assembly.

2.03 FIXED BLADE EXTRUDED ALUMINUM LOUVERS

- A. Louver assemblies shall be 6" deep with drainable, stationary blades, providing a minimum 55.0% free area. Airolite K6746 or Architect approved equivalent meeting all requirements of this specification.
1. Blades shall be stationary, incorporate drainable gutters in front edge of each blade, and be spaced **4-1/2" on center maximum**.
 2. Blades and frames shall be minimum 0.081" wall thickness.
- B. Louvers shall be constructed entirely of extruded aluminum, alloy 6063-T5 or T6.
- C. Blades shall be joined to each jamb frame and vertical stiffening member with two fillet welds each 1" long produced with the pulsed gas metal arc welding (GMAW) process with a minimum 0.125" throat.
- D. Frames shall be joined at each corner with a full length GMAW fillet weld, concealed from view with a minimum 0.125" throat.

1. Jamb frames shall incorporate drainable gutters to ensure resistance to water penetration.
- E. Provide optional extended sill flashing with end dams.
 1. Extruded aluminum, Alloy 6063-T5 or T6. Minimum nominal thickness 0.081 inch (2.1 mm). Finished to match louver.
- F. Provide continuous, perimeter aluminum angles on inside face of louver for securing louver to wall construction. Aluminum angle shall be minimum 1-1/2" x 1-1/2" x 3/16". If equipped with center or intermediate vertical mullion(s), provide coped aluminum clip angles at top and bottom of each mullion. Clip angles shall be 6" x 4" x 3/8" x 3" long minimum.
- G. Each louver shall be fitted with 1/2" mesh x 0.063" diameter aluminum bird screen in a U-shaped frame.
- H. Louver sizes and shapes: See Contract Drawings.

2.04 FIXED BLADE EXTRUDED ALUMINUM LOUVERS - HIGH WIND

- A. Louver assemblies shall be 6" deep with drainable, stationary blades, providing a 55.0% minimum free area and also meet the requirements listed below. Airolite K6746X or Architect approved equivalent.
 1. Maximum Qualified Wind Design Load: +/- 200 p.s.f.
 2. Florida Building Code approved for use in the Wind-Borne Debris Zone and the High Velocity Hurricane Zone (HVHZ).
 3. AMCA Impact Resistant Louver: Enhanced Protection Level E.
 4. Blades shall be stationary, incorporate drainable gutters in front edge of each blade, and be spaced **4" on center maximum**.
 5. **Nominal blade and frame thickness shall be 0.125"**.
- B. Louvers shall be constructed entirely of extruded aluminum, alloy 6063-T5 or T6.
- C. Blades shall be joined to each jamb frame and vertical stiffening member with two fillet welds each 1" long produced with the pulsed gas metal arc welding (GMAW) process with a minimum 0.125" throat.
- D. Frames shall be joined at each corner with a full length GMAW fillet weld, concealed from view with a minimum 0.125" throat.
 1. Jamb frames shall incorporate drainable gutters to ensure resistance to water penetration.
- E. Provide optional extended sill flashing with end dams.
 1. Extruded aluminum, Alloy 6063-T5 or T6. Minimum nominal thickness 0.081 inch (2.1 mm). Finished to match louver.
- F. Provide manufacturer's 0.50" diameter vertical and horizontal security bars at 6" o.c. maximum spacing. Security bars to be provided in their own 4" deep, 12 gauge or heavier frame that is field bolted to louver frame at 12" o.c.. Security bars to be plug welded to security bar subframe at each bar end, Security bars to be finished in manufacturer's standard super durable polyester, concrete gray.
- G. Provide continuous, perimeter aluminum angles on inside face of louver for securing louver to wall construction. Aluminum angle shall be minimum 1-1/2" x 2" x 1/4". If equipped with center or intermediate vertical mullion(s), provide coped aluminum clip angles and aluminum mullion anchor clips at top and bottom of each mullion as recommended by louver manufacturer..
- H. Each louver shall be fitted with 1/2" mesh x 0.063" diameter aluminum bird screen in a U-shaped frame.

- I. Louver sizes and shapes: See Contract Drawings.

2.05 BLANK-OFF PANELS

- A. Uninsulated Blank-Off Panels: Metal sheet attached to back of louver.
1. Aluminum sheet for aluminum louvers, not less than 0.050-inch nominal thickness.
 2. Stainless steel sheet for stainless steel louvers, not less than 0.038-inch nominal thickness, with grain running in same direction as grain of louver blades.
 3. Panel Finish: Same Finish applied to louvers.
 4. Attach blank-off panels with clips.
- B. Insulated Blank-Off Panels: Laminated panels consisting of an insulating core surfaced on back and front with metal sheets and attached to back of louver.
1. Thickness: 1 inch.
 2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch nominal thickness.
 3. Metal Facing Sheets: Stainless steel sheet, not less than 0.031-inch nominal thickness.
 4. Insulating Core: Rigid, glass-fiber-board insulation or extruded-polystyrene foam.
 5. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch nominal thickness, with corners mitered and with same finish as panels.
 6. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
 7. Panel Finish: Same finish applied to louvers.
 8. Attach blank-off panels with clips.

2.06 LOUVER FINISH

- A. Louvers shall be factory primed and finished after assembly with two coats 70% Kynar PVDF/100% Fluoropolymer FEVE coating conforming to AAMA 2605. Primer and coating shall be oven baked in accordance with the coating manufacturer's instructions.
- B. Color as selected by Architect from manufacturer's standard and Mica colors.

2.07 BRICK VENTS

- A. Extruded Aluminum Brick Vent by Greenheck or Architect Approved Equivalent of identical size and finish.
1. Size: 15-5/8" W x 15-3/4" H.
 2. Heavy gauge extruded 6063T5 aluminum standard frame.
 3. 4" x 0.125" nominal wall thickness.
 4. Inside mount insect screen.
 5. Provide optional 0.063 aluminum straight duct to extend 2" past face of inside wall (u.n.o.).
 6. Finish: 2-coat 70% Kynar (PVDF) meeting or exceeding AAMA 2605 requirements. Color as selected by Architect from manufacturer's 27 standard colors.
 - a. Finish Warranty: 10 years.

2.08 SNOW STOPPER SCREENS

- A. Provide exterior mounted Snow Stopper Screens as manufactured by Air Solution Company, West Chester, Ohio, 45071. Phone: (800) 819-2869.
- B. Provide on louvers indicated on Contract Drawings to receive Snow Stopper Screens.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate installation with ductwork/flue pipes, if any, connecting to the louver or brick vent.
- B. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
- C. Comply with manufacturer's published instructions. Conceal fasteners wherever practicable. Install complete with trim, hardware, and accessories. Paint any visible fasteners to match louver color.
 - 1. Set louver sill in a full bed of Polyisobutylene Mastic Sealant as specified in Section 079200 - Sealants.
 - 2. Isolate dissimilar metals in contact with each other.
- D. Tolerances: Install straight, true, plumb, and in alignment for uniform appearance; permanently anchored to building construction with anchors of suitable size and type.
- E. Perform all necessary cutting and drilling of adjacent surfaces required for the installation of the Work. Perform all drilling for anchors with carbide or diamond tipped rotary drills of minimum required sizes, to minimize damage to adjacent construction and finishes.
- F. Install Brick Vents in masonry coursing. Note exterior walls may not be brick.
- G. Install Snow Stopper Screens in accordance with manufacturer's written instructions.

3.02 ERECTION TOLERANCES

- A. Maximum variation from Plumb or Level: 1/8-inch
- B. Maximum misplacement from Intended Position: 1/8-inch

3.03 CLEANING AND PROTECTION

- A. Before acceptance, clean Work thoroughly of dirt, grease, and other foreign matter, and leave all surfaces in perfect condition.
- B. Remove all protective coverings.
- C. After erection, protect finished installation as necessary to avoid damage.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The work of this Section consists of providing all labor, materials and equipment and services to complete the following terrazzo floor repairs on the building interior, including but not limited to:
 - 1. Cleaning terrazzo floors.
 - 2. Repairing or patching damaged terrazzo.
 - 3. Pouring new terrazzo in areas noted on drawings.
 - 4. Replacing damaged Zinc divider strips
 - 5. Sealing the terrazzo floors.

1.02 REFERENCES

- A. Comply with the specifications and recommendations of the NTMA (National Terrazzo and Mosaic Association).
- B. General Service Administrations (GSA) Preservation Note 43, Restoring and Maintaining Terrazzo Flooring
- C. ASTM C150/C150M - Standard Specification for Portland Cement
- D. ASTM C33/C33M - Standard Specification for Concrete Aggregates
- E. ASTM C241 - Standard Test Methods for Abrasion Resistance
- F. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

1.03 JOB CONDITIONS

- A. Quantity and Location: The Contractor and the Architect shall review all of the areas mentioned to confirm quantities and location of terrazzo floor repairs.

1.04 QUALITY ASSURANCE

- A. Work shall be performed by a Contractor specializing in the fabrication and repair of terrazzo floors. The Contractor must have a minimum of five (5) years of experience. Contractor must demonstrate three projects similar in scope and type to the required work in the New York region(s).
- B. Mechanics shall be highly skilled in the art and necessary crafts of terrazzo floor repair, with the work of this Section to the highest standard for such work. No allowances will be made for the lack of skill of mechanics.
- C. All work shall be carried out in accordance with the standards of the National Terrazzo and Mosaic Association, Inc., except where indicated in these specifications.
- D. Contractor should be a member of The National Terrazzo and Mosaic Association, Inc., or certified by that organization as qualified to perform the work of this Section in accordance with the specified requirements.

1.05 SUBMITTALS

- A. Submit qualification data and references for firms and persons specified in the "Quality Assurance" Article above to demonstrate their capabilities and experience.
- B. Contractor shall submit a work plan including detailed description of how the work of this Section shall be accomplished. This should include products to be used, methods and equipment for terrazzo floor restoration and associated work.
- C. Provide written descriptions, drawings and diagrams outlining proposed methods and procedures for protection of personnel, the public and the existing construction during the work of this Section.
- D. Submit drawings indicating the type, size, and layout of divider strips and control joints strips and color of floor areas.
- E. Product Literature: The Contractor shall submit copies of the manufacturer's technical data for each product including their recommendations for installation and use. Include test results and certificates that verify the product's compliance with the specification's requirements. One complete set of product literature and MSDS shall be placed in a 3-ring loose-leaf binder and shall be present on the job site at all times for the reference of the Architect.
- F. Samples:
 - 1. Samples of all aggregate including marble chips for new terrazzo.
 - 2. Three (3) samples of each color of replacement terrazzo required.
 - 3. Provide cured samples of terrazzo patching repair mix, not less than 12" square.
 - 4. One (1) 6-inch sample of the replacement divider strip for the joint.
- G. If alternate methods and materials to those specified are proposed for any phase of the restoration work, provide written description. Provide evidence of successful use on comparable projects and demonstrate its effectiveness for use on this project.
- H. Mock-ups: At an area on the site where approved by the Owner, provide a mock-up demonstrating terrazzo floor repairs. The mock-ups may be part of the Work, and may be incorporated into the finished work, when so approved by the Architect. Revise as necessary to secure the Architect's approval. The mock-up panels, when approved by the Architect will be used as the standard for all terrazzo floor repairs as the basis for acceptance or rejection of the Work. Mock-ups are to include:
 - 1. Patching repair sample.
 - 2. Metal divider strip replacements.
 - 3. New panel installation.
 - 4. Cleaning and polishing.

1.06 COORDINATION

- A. Delay grinding, sealing and finishing until heavy trade work is completed and construction traffic through the area is restricted.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS

- A. Provide a commercially prepared product formulated especially for cleaning terrazzo floors, having a pH of between 7 and 10, free from crystallizing salts or water soluble alkaline salts, biodegradable, and phosphate free.

2.02 SEALING MATERIALS

- A. Provide a commercially prepared sealer formulated especially for sealing terrazzo, having a pH between 7 and 10, non-discoloring or yellowing, providing a slip-resistant surface with a flash-point of 95 degrees Fahrenheit minimum in accordance with ASTM D56.

2.03 PATCHING MATERIALS

- A. Portland Cement: shall comply with ASTM C150/C150M, Type I, white.
- B. Sand: shall comply with ASTM C33/C33M for fine aggregates.
- C. Marble Chips: Provide in conformance with MTMA standards and with the following attributes:
 - 1. Shall comply with ASTM C241 with HA10 minimum, and with 24-hour absorption rate of not more than 0.75%.
 - 2. Provide chips containing no deleterious or foreign matter, and with dust content less than 1% by weight.
 - 3. Label bags legibly with correct name and size of chips.
 - 4. Colors and gradation of aggregates sizes as required to match original existing intact materials and patterns. Original plans often contain the exact terrazzo mix.
 - 5. Aggregate colors should be matched after cleaning or taken from the interior of core samples depending upon the scope of work.
- D. Colorants: Provide alkali-resistant non-fading color pigments as appropriate to each particular terrazzo mixture required.
- E. Curing Compound: Liquid-membrane-forming compound, ASTM C309, Type I.
- F. Reinforcement: Provide 16 gage, 2 inch by 2 inch galvanized welded wire fabric which complies with ASTM A185.

2.04 EQUIPMENT

- A. Plastic sheeting.
- B. Grinding stones: fine grit emery stones manufactured specifically for restorative type grinding and surfacing of terrazzo surfaces (#40 and #80 grit stones).
- C. Power saw.
- D. Hand tools:
 - 1. Trowel
 - 2. Chisel
 - 3. Hand Grinder
- E. Resurfacing Screens: a fine grit screen manufactured specifically for restorative type grinding and resurfacing terrazzo surfaces.

2.05 BRASS JOINT STRIPS

- A. Zinc joint strips to match existing in size, shape and color.

PART 3 - EXECUTION

3.01 TEMPORARY PROTECTION

- A. Cover adjacent surfaces and adjacent decorative features with protective sheeting to contain any fragments and dust during removal and preparation and to contain materials during their application.

3.02 INSPECTION

- A. The Contractor shall examine substrates and conditions under which this work is to be performed and notify the Construction Manager in writing of conditions detrimental to the proper completion of the work. Do not proceed until unsatisfactory conditions are corrected. Commencement of work indicates that Contractor accepts substrate and conditions.
- B. Correct any conditions that are detrimental to the successful completion of the work. Sequencing of work should be scheduled to ensure that completed work will match existing.
- C. Perform a thorough examination of the existing conditions. Perform any necessary tests on an inconspicuous surface to determine the current conditions and appropriate steps and materials necessary for replication and replacement of select areas of existing terrazzo surface.

3.03 PATCHING DAMAGED TERRAZZO

- A. Surface Preparation.
 - 1. Sawcut around the area to be patched. The perimeter of the area to be patched should have vertical sides that are perpendicular to the horizontal surface. Do not feather the edge of the void. If the patch is larger than an inch square, slightly undercut this edge. Remove all loose and deteriorated terrazzo.
 - 2. Clean surface of debris and any obstructing material. Saturate void with water to prevent quick surface drying. Ensure that water penetrates into the surface in order to achieve a proper bond.
 - 3. Apply a cement paste and work into the surface. Do not allow cement paste to dry before placing terrazzo composition.
- B. Application:
 - 1. Mix two parts blended marble chips with one part Portland cement and coloring pigment. Add enough water to make this mix plastic in strict accordance with the manufacturer's specifications.
 - 2. Apply this mixture to the prepared void, making sure it is applied to the wet cement paste preparation layer. Work the patching material into the void ensuring intimate contact to all areas including sides of the void.
 - 3. Seed additional marble chips of the same blend over the patch, as required to establish a uniform coverage.
 - 4. Compact patch, remove all excess water and cement from the surface.
 - 5. Cover the patch with paper or polyethylene sheeting to prevent quick hydration. Cure until topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding.
 - 6. Sand surface with a hand sander or small grinding tool, using fine grit stones to achieve desired finish.
 - 7. Use a #40 or finer grit stone for the initial grinding, exposing the marble chips. Follow with a fine #80 grit stone.
 - 8. Thoroughly rinse surface with clean, clear, potable water.
 - 9. Remove excess rinse water and machine or hand apply grout using identical Portland cement color and pigments as used in topping taking care to fill all voids completely.

10. Cover grouted surface with paper or polyethylene for at least 72 hours.
11. Final polish with a #80 or finer grit stone. Care should be taken to limit grinding and polishing to a small distance beyond the perimeter of the patch.
12. Produce a finished terrazzo surface showing a percentage of marble chips equal to that of the existing terrazzo surface.
13. Seal patch with a penetrating type terrazzo sealer per the SEALING MATERIALS Article.

3.04 TERRAZZO PROPORTIONS

- A. Terrazzo underbed shall be composed of one part Portland cement to four parts sand. Water shall be added to provide workability at as low a slump as possible. Spread to a level ½-inch below the finished surface.
- B. Terrazzo Topping shall be composed of one 94 pound bag of Portland cement per 200 pounds of marble chips and approximately 5 gallons of water. Color pigment shall be added as needed but not to exceed 2 pounds per bag of cement. Water shall be added in sufficient quantity to provide workability at as low a slump as possible in strict accordance with the manufacturer's specifications.

3.05 UNDERBED PLACEMENT

- A. Surfaces of concrete subfloor shall be cleaned and saturated with water in accordance with NTMA Info Guide. Do not treat substrate to receive terrazzo with curing agents or additives which would preclude or inhibit bonding. Excess water shall be removed from the subfloor before slushing and brooming with neat cement paste.
- B. The underbed shall be placed on the concrete subfloor and shall be screeded to an elevation of ½ inch below the finished floor.
- C. Divider strips shall be installed in the semi-plastic underbed.
- D. The underbed shall be firmly troweled along the edges to insure positive anchorage of the divider strips. Expansion type joint strips shall be installed over the subfloor expansion joints and shall extend the full depth of the underbed.

3.06 REPLACEMENT OF DIVIDER STRIPS

- A. Replace missing divider strips to match existing in all respects (material, depth, exposed width and configuration.).
- B. If replacing divider strips in an area where the surrounding terrazzo is sound, set the strips in epoxy.

3.07 SETTING DIVIDER STRIPS

- A. Set in accordance with the layout indicated in the approved shop drawings while the underbed is still plastic.
- B. Set strips in straight lines and to the proper level to ensure that tops of the strips will show uniformly after completing grinding and finishing operations. Fit joints and intersections tight.

3.08 PLACING TERRAZZO TOPPING

- A. The underbed shall be slushed and broomed in accordance with NTMA Info Guide with neat cement paste of the same color as required for the topping.

- B. The topping shall be placed in sections formed by divider strips and shall be troweled level with the top of the strips.
- C. The troweled surface shall be seeded with chips in the same color proportions as contained in the terrazzo mix, troweled and rolled with heavy rollers until excess water has been extracted.
- D. The terrazzo shall be troweled to a uniform surface disclosing the lines of the divider strips.

3.09 CURING

- A. The terrazzo shall be cured until the topping develops sufficient strength to prevent lifting or pulling of the terrazzo during grinding.
- B. Keep the completed terrazzo continuously moist and free of traffic during the curing period.
- C. Cure by covering with a liquid membrane-forming compound, sheet materials, wet sand, or sprinkling with water.

3.10 FINISHING

- A. Finishing shall be in accordance with the NTMA Info Guide.

3.11 ROUGH GRINDING

- A. After the topping has cured, the terrazzo shall be machine ground using the wet method, to a true even surface using No. 24 or finer grit followed by No. 8 grit or finer grit stone. Finished surface shall not vary more by more than 1/4-inch in 10 feet.

3.12 GROUTING

- A. After rough grinding, the floor shall be rinsed with clean water.
- B. After removing excess rinse water, the floor shall be grouted using identical Portland cement, color and pigments as used in the topping, taking care to fill all voids.
- C. After the grout has attained its initial set, the surface shall be cured for a minimum of 72 hours.

3.13 FINE GRINDING

- A. After the grout has cured, the surface shall be ground with fine grit stones until all grout is removed from the surface.

3.14 CLEANING AND SEALING

- A. The terrazzo shall be washed with a neutral cleaner and, where required, shall be cleaned with a fine abrasive to remove stains and cement smears.
- B. Ensure the surface to be sealed is dry, and free of dirt and debris.
- C. Apply the sealer according to the manufacturer's recommendations.
- D. Ensure that an even, streak-free finish is achieved.
- E. Allow the sealer to cure as per the manufacturer's recommendations prior to receiving traffic.

3.15 ADJUSTING / CLEANING:

- A. Upon completion of all other work of this Section, inspect all terrazzo surfaces and correct conditions which do not meet the specified requirements.
- B. Remove protective materials from adjacent surfaces.
- C. Upon completion of the sealing process, provide adequate protection to prevent damage to the finished terrazzo surfaces until final acceptance of the Work.
- D. Clean the work of this Section in accordance with recommendations of the manufacturers of the materials used.
- E. Provide terrazzo surfaces free from cracks, chips and other surface defects.

3.16 PROTECTION

- A. The terrazzo work shall be covered and protected from damage until the completion of the work of all other trades.

END OF SECTION

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Interior gypsum wallboard.
 - 2. Tile backing panels.
 - 3. Non-load-bearing steel framing.
- B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
 - 1. Section 072100 – BUILDING INSULATION for insulation in gypsum wallboard assemblies.
 - 2. Section 092120 - GYPSUM BOARD SHAFT WALL ASSEMBLIES for framing, gypsum panels, other components of shaft wall assemblies, and finishing gypsum board shaft wall assemblies.
 - 3. Division 22 - 28 for furnishing access doors and frames for installation in gypsum board assemblies.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide fire stop tracks capable of withstanding deflection within limits and under conditions indicated.
 - 1. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.05 QUALITY ASSURANCE

- A. 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.
- B. 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.
- C. Drywall Recycling: All new paper-faced gypsum wallboard scrap (cuts from construction but not demolition waste) shall be recycled by Gypsum Recycling America LLC or approved equal.
- D. Unit Mock-up: Provide materials, products, and components as specified herein for 1 complete 1-bedroom unit mock-up and 1 short corridor mock-up. Refer to Section 014330 – Mock-ups for additional requirements.

- E. Mockups: Before beginning gypsum board installation, install mockups 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.
 - b. Each texture finish indicated.
 - 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.

1.06 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 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.

1.08 WARRANTY

- A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective work within specified warranty period.
 - 1. Warranty Period: As standard with manufacturer unless indicated otherwise.

PART 2 - PRODUCTS

2.01 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. 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: manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.
 - 3. Structural Requirements: Refer to structural drawings for additional requirements and locations.

2.02 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: Post installed, expansion anchor.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges with depth as required for span and loading and indicated on Drawings.
- E. Furring Channels (Furring Members): 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
- F. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; Drywall Furring System.
 2. USG Corporation; Drywall Suspension System.

2.03 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645.
 1. Minimum Base-Metal Thickness: 0.0312 inch.
- B. Slip-Type Head Joints: Where indicated, provide one of the following:
 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 2. 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.
 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Steel Network Inc. (The); VertiClip Series.
 - 2) Superior Metal Trim; Superior Flex Track System (SFT).
- C. Fire Stop 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 compatible with studs and in width to accommodate depth of studs.
 1. Grace Construction Products; FlameSafe FlowTrak System.
 2. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
 3. Metal-Lite, Inc.; The System.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 1. Minimum Base-Metal Thickness: 0.0312 inch.
- E. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
 1. Depth: 1-1/2 inches.

2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 1. Minimum Base Metal Thickness: 0.0312 inch.
 2. Depth: 1-1/2 inches.
- G. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
 1. Configuration: Asymmetrical.
 2. Basis of Design: Provide Clark Dietrich Building Systems, RC-1 Pro Resilient Channel (RCUR); 25 gauge; or approved equal.
- H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- I. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- J. Isolation Strip at Exterior Walls: 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.

2.04 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. USG Corporation.
 - b. G-P Gypsum.
 - c. National Gypsum Company.
 2. Prohibited Manufacturers: Gypsum board manufactured in China is not permitted.
- B. Fire-Resistant Type X, Typical Locations: ASTM C 1396.
 1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- C. Fire-Resistant Type C:
 1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- D. Moisture & Mold Resistant:
 1. Use: Painted wallboard at toilet rooms, showers, janitor's closets, exposed to weather locations, and all other moist but not wet areas. Do not use behind tile nor at tub surrounds.
 2. ASTM C1396 (Section 5), regular type except where Type C fire-resistant type is indicated or required to meet UL assembly types.
 3. Basis of Design: DensArmor Plus by Georgia-Pacific.
 4. Edges: Tapered.
 5. Thickness: 5/8 inch or as indicated.

2.05 TILE BACKING FOR TUB AND SHOWERS

- A. DensShield® Tile Backer as manufactured by Georgia-Pacific Gypsum LLC
 1. Thickness: 5/8 inch.

2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
3. With manufacturer's standard edges.

2.06 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.
 - e. Curved-Edge Cornerbead: With notched or flexible flanges.
- B. Exterior Trim: ASTM C 1047.
 1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.
- C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.07 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 1. Interior Gypsum Wallboard: Paper.
 2. Exterior Gypsum Soffit Board: Paper.
 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 4. Tile Backing Panels: As recommended by panel manufacturer.
- 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, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
 2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
- E. Joint Compound for Tile Backing Panels:
1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.08 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from
 2. 0.033 to 0.112 inch thick.
 3. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Acoustical Sealant: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
 3. Acoustical Sealant for Concealed Joints:
 - a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
 - b. Pecora Corp.; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and 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.

3.02 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.03 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754. 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.

3.04 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.

3.05 INSTALLING FRAMED ASSEMBLIES

- 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.
- 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 doorframes; 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.
 - 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches o.c.
- D. Resilient Furring: Use Type W, 1" long fasteners for walls and 1-1/4" long fasteners for ceilings; don't pinch channel against studs, joists, and trusses.
- E. Direct Furring: Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Furring Members:
 - 1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.

2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

3.06 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.
 1. Locate control and expansion joints where indicated on Drawings.
- 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.

3.07 APPLYING INTERIOR GYPSUM BOARD

- A. 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 to minimize end joints.
 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance- rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- D. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.08 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
1. Install with 1/4-inch trimmed open joint space where panels abut other construction or structural penetrations.
 2. Fasten with corrosion-resistant screws.

3.09 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.1, at locations indicated to receive tile, with joints treated to comply with ANSI A108.11.
- B. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
- D. Tile backing panels around bathtub surrounds shall continue up to ceiling and be skim coated at exposed locations above tile.

3.10 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 according to ASTM C 840 and in specific locations, indicated on Drawings and approved by Architect for visual effect.
 - 1. Spacing: Maximum spacing shall not exceed 30'-0".
 - 2. Refer to Interior Design drawings.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners, unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. Curved-Edge Cornerbead: Use at curved openings.
- D. Exterior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges..
- E. Aluminum Trim: Install in locations indicated on Drawings.

3.11 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, rounded or beveled edges, 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:
 - 1. Level 1: Ceiling plenum areas and concealed areas not exposed to view.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 3: Not used.
 - 4. Level 4: Panel surfaces that will be exposed to view (typical panels).
 - 5. Level 5: Clubhouse, Leasing area, and where indicated on Drawings.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.12 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, or exhibit mold growth. Repair of damaged panels in place is not acceptable.
 - 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

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes: Gypsum board shaft wall assemblies
- B. Chase Enclosures.

1.03 ACTION SUBMITTALS

- A. Submit manufacturers' product information, specifications, and installation instructions for the specified products including, GWB, joint compounds, fasteners, trim, control joints, joint reinforcing, metal furring members, metal studs, tracks, runners, bridging, resilient channels, steel grounds, and all related accessories.
- B. Product Data: For each component of gypsum board shaft wall assembly.
- C. Noise Barrier:
 - 1. Provide product data for vinyl noise barrier.
 - 2. Provide shop drawings for approval indicating all walls that will receive noise barrier, also indicating which side of the wall the barrier will be placed on.

1.04 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For shaft wall assemblies firestop tracks, from ICC-ES.
- B. Test Reports:
 - 1. For all stud framing products that do not comply with ASTM C645 or C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.
 - 2. Acoustical Test Report: provide acoustical test report from a qualified testing agency indicating the Noise Barrier meets a STC value of at least 25 per ASTM E90 and ASTM E413.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer, unless otherwise indicated.
- C. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- D. Single-Source Responsibility for Finishing Materials: Obtain finishing materials either from the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.
- E. Fire-Test-Response Characteristics: Where fire-rated gypsum board assemblies are indicated, provide gypsum board assemblies that comply with the following requirements:

1. Fire Resistance Ratings: As indicated by reference to GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Gypsum board assemblies indicated are identical to assemblies tested for fire resistance according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 3. Deflection and Firestop Track: Top runner provided in fire-resistance-rated assemblies indicated is labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- F. Noise Barrier Manufacturer Qualifications:
1. Manufacturer shall have a minimum of five (5) years experience in the production of specified products and shall furnish supporting documentation showing completed jobs of approximately the same size and scope. Provide Owner and Architect contact information for all projects listed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage.
- B. Stack panels flat and supported on risers on a flat platform to prevent sagging.
- C. Noise barrier: Protect Noise Barrier material from excessive moisture when shipping, storing, and handling. Deliver unopened skids and store in a dry place with adequate air circulation. Do not deliver material until that portion of the building requiring noise barrier installation is enclosed and weathertight.

1.07 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or with 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, moisture damaged, or mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

2.02 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following:
 1. Gypsum Board and Related Products
 - a. CertainTeed

- b. G-P Gypsum Corp.
 - c. National Gypsum Company
 - d. USG Corporation.
- 2. Steel Framing and Furring
 - a. ClarkDietrich Building Systems
 - b. National Gypsum Company
 - c. United States Gypsum Company
 - d. Marino/Ware: a Division of Ware Industries, Inc.
- 3. Noise Barrier
 - a. DDS Acoustical Specialties, 43 Mainline Drive, Westfield, MA 01085. Phone: 413-248-8118.
 - b. Architect approved equivalent.

2.03 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: As indicated.
- B. Studs: Manufacturer's standard E, H and C-H profiles for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 - 1. Depth: As indicated 2-1/2 inches (64 mm).
 - 2. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
- C. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches (51 mm) long and matching studs in depth.
 - 1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
- D. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.
- E. Room-Side Finish: Gypsum board.
- F. Shaft-Side Finish: Gypsum shaftliner board, moisture-and mold-resistant Type X.
- G. Insulation: Sound attenuation blankets.
- H. Noise Barrier:
 - 1. Non reinforced loaded vinyl barrier.
 - a. Thickness: 0.1 inches
 - b. Density 1.0 lbs. per square foot.
 - c. Tensile Strength: minimum 220 lbs. per square inch.
 - d. Elongation: minimum 140%
 - e. Tear Strength: minimum 40 lbs per inch.
 - f. STC Rating: 26.
 - g. Flammability Rating: Material shall pass UL 94 HB.
 - h. Sound Transmission Loss: Per ASTM E90 and ASTM E413:
 - 1) Octave Band Center Frequency (Hz):
 - 2)

125	250	500	1000	2000	4000	STC
13	17	22	26	32	37	26
 - i. Standard Width: 54 inches.
 - 2. Construction:
 - a. Supplied in 54" wide panels or rolls x length required.

2.04 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

- B. Gypsum Shaftliner Board, Type X or C as required by UL Assembly: ASTM C1396/C1396M; manufacturer's proprietary fire-resistive liner panels with paper faces.
- C. Gypsum Shaftliner Board, Moisture- and Mold-Resistant Type X or C as required by UL Assembly: ASTM C1396/C1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; Dens-Glass Ultra Shaftliner.
 - b. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner XP.
 - c. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panel.
 - 2. Thickness: 1 inch (25.4 mm).
 - 3. Long Edges: Double bevel.
 - 4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D 3274.
- D. Gypsum Board: As specified in Section 092900 - GYPSUM BOARD

2.05 NON-LOAD-BEARING STEEL FRAMING

- A. Steel Framing Members: Comply with ASTM C645 requirements for metal unless otherwise indicated.
 - 1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A653/A653M, G40 (Z120) ASTM A653/A653M, G60 (Z180), hot-dip galvanized unless otherwise indicated.
- B. 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.

2.06 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
- D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
- E. Sound Attenuation Blankets: As specified in Section 092900 - GYPSUM BOARD.
- F. Acoustical Sealant: As specified in Section(s) 092900 - GYPSUM BOARD and 079200 - JOINT SEALANTS .

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and

structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 078100 - APPLIED FIRE PROTECTION .
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.03 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturers written installation instructions, and ASTM C754 other than stud-spacing requirements.
- B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.
 - 1. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with 0.033-inch (0.84-mm) minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.
- D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- G. Control Joints: Install control joints at locations indicated on Drawings while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
- H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

- I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.04 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, or mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.05 LEVEL OF FINISH

- A. Surfaces to receive tile, surfaces to receive fire taping, and/or surfaces not exposed to view, shall be finished to a minimum of AWCI Level 2.
- B. Surfaces to receive heavy textured finish or heavy grade wall covering shall be finished to a minimum of AWCI level 3.
- C. Surfaces to receive paint or light grade wall coverings shall be finished to a minimum of AWCI level 4.
- D. Surfaces to receive gloss, semi-gloss, or egg shell paint shall be finished to a minimum of AWCI level 4.
- E. Level 5 finish only required in locations specifically noted on the contract drawings. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.06 TOLERANCES

- A. Maximum variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet in any direction.

3.07 WASTE MANAGEMENT

- A. Plan and coordinate work to minimize generation of off-cuts and waste. Sequence work to maximize use of GWB off-cuts and waste.

3.08 CLEANING AND REPAIR

- A. Clean all excess materials each day. Promptly remove any residual joint compound from adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures gypsum board assemblies remain without damage or deterioration at time of Substantial Completion.
- C. Repair damaged work prior to Punch List

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
 - 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.
 - 3. Partial Wall Framing Supports.
 - 4. Adjustable Aluminum Mullion/Partition Closures.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.02 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for metal unless otherwise indicated.
 - 2. See "Corrosion Protection of Steel Framing" Article in the Evaluations for a discussion of corrosion-resistant coatings on components.
 - 3. Protective Coating: ASTM A653/A653M, G60 (Z180), hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C645. Use either steel studs and runners or dimpled steel studs and runners.
 - 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 18 gauge (0.043 inch) and 20 gauge (0.033 inch) as indicated on the drawings.
 - b. Depth: 4 inches, 3-5/8 inches, 2-1/2 inches, 1-5/8 inches as indicated on the drawings.
 - 2. Dimpled Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 20 gauge (0.027 inch).
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, provide one of the following:

- 1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
 - 2) Steel Network Inc. (The); VertiTrack VTD Series.
 - 3) Marino/Ware; Slotted Track SLT
- 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.
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: As indicated on Drawings or a minimum of 0.033 inch.
- F. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch wide flanges.
1. Depth: 1-1/2 inches.
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. Minimum Base-Metal Thickness: 20 gauge (0.033 inch).
 2. Depth: 7/8 inch, 1-1/2 inches as indicated on the drawings.
- H. Resilient Furring Channels: 1/2-inch deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical.
 2. Manufacturer: Clark- Dietrich; Model RCSD or Architect approved equal.
- I. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 16 gauge (0.057 inch) gauge, and depth required to fit insulation thickness indicated.
- J. Column Flange Grip Clips: Pre-manufactured Column/Beam connectors for rapid installation of board type materials to Steel Column and Beam Flanges. ASTM A1003/A1003M Structural Grade 33 (230) Type H, ST33H (ST230H): 33ksi (230MPa) minimum yield strength, 45ksi (310MPa) minimum tensile strength, 27mil minimum thickness (22 gauge, 0.0283" design thickness) with ASTM A653/A653M G60 (Z180) hot dipped galvanized coating. Manufacturer: The steel Network, Inc. Unit connection box measures 1 inch deep, 2 inches wide and 2 1/2 inches long with a spring clip depth of 2.375 inches and a curved clip spring clearance of .2 inches.
1. Install as indicated on the drawings. Maximum spacing 24" on center.

2.03 SUSPENSION SYSTEMS

- A. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- B. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch wide flanges.
1. Depth: As indicated on Drawings.
- D. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 16 gauge (0.054 inch) uncoated-steel thickness, with minimum 1 1/2-inch wide flanges, 3/4 inch deep.
 2. Dimpled Steel Studs and Runners: ASTM C645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings or 20 gauge (0.033 inch).
 - b. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.

2.04 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), non-perforated.
 2. 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.
- C. Partial Wall Framing Supports: Pony Wall Heavy (PW) framing supports for partial height cantilever wall systems unsupported at the top track utilizing 12 gauge (0.107 inch thick) stud members, Structural Grade 50 (50 ksi minimum yield strength), ASTM A653 and ASTM A1003. Moment of Inertia: 0.7739 inches⁴ for deflection design. Integral Heavy Base Plate; 12 inch thick, ASTM A36 (36 ksi minimum yield strength, 8 inch long x 3 3/8 inch wide x 1/2 inch thick plate with five bolt hole locations spaced per manufacturer to accept 1/2 inch diameter Hilti Kwik Bolt-3 in quantities indicated on the drawings. Manufacturer: Clark-Dietrich or Architect approved equivalent.
 1. Model(s): PW24 (23 3/4 inches long), PW36 (35 3/4 inches long), and PW48 (47 3/4 inches long) as indicated.
- D. Adjustable Aluminum Mullion/Partition Closures: MULLION MATE – SERIES 40 PLUS extruded aluminum partition closure shall be manufactured by Gordon Interior Specialties Division, Gordon, Inc., 5023 Hazel Jones Road, Bossier City, LA 71111, (800) 747-8954, Fax (800) 877-8746, sales@gordoninteriors.com or approved equal.
 1. Aluminum extrusions: 6063-T5 temper, tensile strength 31 KSI, ASTM B221.
 - a. Size(s): Mullion Mate 3: 2 7/8 inch through 3 15/16 inch, Mullion Mate 4: 4 inch through 4 15/16 inch, Mullion Mate 5: 5 inch through 6 15/16 inch, Mullion Mate 7: 7 inch through 9 3/4 inch, and Mullion Mate 9: 9 inch through 13 3/4 inch or as required by the field conditions.
 - b. Length: 10 foot or as required by field conditions.
 - c. Finish: Acrylic-Polyester hybrid powder-coat paint finish in color as selected by the Architect from the manufacturer's full color offering.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.03 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment, services, heavy trim, grab bars, toilet accessories, and 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.

3.04 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
 - 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
 - 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (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. 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.

4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
5. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
 - c. Products such as Curv-Trak and Flex-C Trac may be submitted for approval to accomplish radius wall applications.
- E. Direct Furring:
 1. Screw to wood framing where applicable.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Furring Members:
 1. Erect insulation, specified in Section 072100 - ASPHALT SHINGLES, vertically and hold in place with Z-furring members spaced 24 inches o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.05 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types as indicated.
 1. Hangers: 48 inches o.c.
 2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 16 inches o.c.
- 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.

END OF SECTION

SECTION 093013 - CERAMIC TILING - THIN-SET **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Ceramic and Porcelain tile.
 - 2. Stone thresholds.
 - 3. Waterproof membrane.
 - 4. Uncoupling Membranes.
 - 5. Tile backing panels.
 - 6. Metal edge strips.

1.03 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 A118.1, ANSI A108.2, 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 "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.04 PERFORMANCE REQUIREMENTS

- A. Dynamic Coefficient of Friction (DCOF AcuTest): For tile installed on walkway surfaces, provide products with the following values as determined by testing in accordance with ANSI standard ANSI A137.1, Section 9.6:
 - 1. Wet & Level Interior Surfaces: minimum 0.42.
 - 2. Step Treads: minimum 0.42.
 - 3. Ramps and Inclined Surfaces: minimum 0.65.
 - 4. Exterior Floors & Pool Decks: minimum 0.60.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Samples for Initial Selection: For each type of tile and grout indicated, provide full range of colors and patterns available from the approved manufacturer. Include Samples of accessories involving color selection.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

SECTION 093013 - CERAMIC TILING - THIN-SET **H2M**

- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer certifying that products meet or exceed the specified requirements of ANSI A137.1.
- C. Product Certificates: For each type of product, signed by product manufacturer.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.07 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.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum two years' experience.
- B. Single Source Responsibility: Obtain each type and color of tile from a single source. Obtain each type and color of mortar, adhesive and grout from the same source.

1.09 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 requirements in ANSI A137.1 for labeling 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 can be avoided.
- D. Store liquid materials 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.

1.10 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

2.01 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

SECTION 093013 - CERAMIC TILING - THIN-SET **H2M**

1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.2, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.
- D. Factory Blending: For tile exhibiting color variations within ranges, 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.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.
- G. Grout Release: High-performance, sacrificial, water-based coating to protect tile from grout residue and haze. Rinses with water during clean-up. Apply two coats and allow to cure for one-hour minimum prior to grouting. Installation and removal shall be as recommended by the manufacturer.
 1. Manufacturer: Mapei "UltraCare" Grout Release or approved equal.

2.02 TILE PRODUCTS

- A. Tile Type: Porcelain glazed floor tile.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Olean; Division of Dal-Tile International Inc.
 - b. Daltile; Division of Dal-Tile International Inc.: Ayers Rock
 - c. Architect approved equivalent
 2. Face Sizes: 13 x 20
 3. Thickness: 3/8 inch.
 4. Wearing Surface: Nonabrasive, smooth.
 5. Finish: Matte, clear glaze.
 6. Tile Colors: As selected by Architect from manufacturer's full color range.
 7. Tile Patterns: As indicated on the drawings.
 8. Grout Colors: As selected by Architect from manufacturer's full color range.
 9. For Furan-grouted quarry tile, pre coat with temporary protective coating.
 10. 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:
 - a. Base Trim: 3 x 13 Bullnose or as indicated on the drawings
- B. Glazed Wall Tile CT-5:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Daltile; Division of Dal-Tile International Inc: Mesmerist
 - b. Architect approved equivalent
 2. Module Size: 3 inch x 12 inch or as indicated on the drawings.
 3. Thickness: 5/16 inch.

SECTION 093013 - CERAMIC TILING - THIN-SET **H2M**

4. Face: Random formed edges.
5. Finish: Polished, clear glaze.
6. Joint Width: 1/8 inch
7. Tile Color: As selected by Architect from manufacturer's full color range.
8. Tile Pattern: As indicated on the drawings.
9. Grout Color: As selected by Architect from manufacturer's full color range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes selected from manufacturer's standard shapes.

2.03 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface. Comply with ICC A117.1 requirements.
 2. Size: 6 inches toe to toe unless noted otherwise. Cope thresholds to door frame profile.
- B. Granite Thresholds: ASTM C615/C615M, with honed finish.
 1. Description: Uniform, medium-grained, Gray stone without veining.

2.04 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108/A118/A136.1 or ASTM C1325, in maximum lengths available to minimize end-to-end butt joints. Provide 2 inch wide coated glass fiber tape for joints and corners.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Custom Building Products; Wonderboard.
 - b. USG Corporation; DUROCK Cement Board.
 2. Thickness: 5/8 inch or as indicated.

2.05 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Chlorinated Polyethylene Sheet: Non-plasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch (0.76-mm) nominal thickness.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Noble Company (The); Nobleseal TS.
 - b. Architect approved equivalent.
- C. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Laticrete International, Inc.; Laticrete 9235 Waterproof Membrane.
 - b. MAPEI Corporation; Mapelastic AquaDefense with MAPEI Fiberglass Mesh.
 - c. Architect approved equivalent.
- D. MAPEI – Mapeguard WP200

SECTION 093013 - CERAMIC TILING - THIN-SET^{H2M}

1. Description: Flexible polyethylene sheet membrane with polypropylene fabric on both sides with a low perm rating ideal for vapor protection in showers, wet areas, and steam rooms. Thickness is 0.02" (40 -50 mils nominally), blue in color.
 2. Waterproofing seaming membrane:
 - a. Provide MAPEI Mapeguard WPST Seam Tape and Mapeguard PIC & POC Corners material 0.004" (4 mil) thick, polyethylene membrane, with polypropylene fleece laminated on both sides.
 3. Waterproofing Accessories:
 - a. Provide MAPEI Mapeguard VC, (Valve seals).
 - b. Provide MAPEI Mapeguard PC, (Pipe seals).
- E. Schluter®-KERDI or approved equal.
1. Description: 0.008" (8 mil) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides, which meets or exceeds the requirements of the "American National Standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10," and is listed by cUPC®, and is evaluated by ICC-ES (see Report No. ESR-2467 and PMG 1204).
 2. Waterproofing seaming membrane:
 - a. Provide Schluter®-KERDI-BAND Seams and Corners material 0.004" (4 mil) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.
 3. Waterproofing Accessories:
 - a. Provide Schluter®-KERDI-SEAL Mixing Valve seals.
 - b. Provide Schluter®-KERDI-SEAL pipe seals.

2.06 UNCOUPLING MEMBRANE

- A. Schluter®-DITRA or approved equal.
1. Description: 1/8" (3 mm) thick, orange, high-density polyethylene membrane with a grid structure of 1/2" x 1/2" (12 mm x 12 mm) square cavities, each cut back in a dovetail configuration, and a polypropylene anchoring fleece laminated to its underside. Conforms to definition for uncoupling membranes in the Tile Council of North America Handbook for Ceramic Tile Installation; and meets or exceeds the requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10," and is listed by cUPC®, and is evaluated by ICC-ES (see Report No. ESR-2467 and PMG 1204).
 2. Manufacturer: Schluter Systems, L.P., 194 Pleasant Ridge Road, Plattsburgh, NY 12901-5841. Tel.: (800) 472-4588. Fax: (800) 477-9783. E-mail: specassist@schluter.com. Internet: www.schluter.com.
 3. Waterproofing seaming membrane:
 - a. Provide with Schluter®-KERDI-BAND Seams and Corners material 0.004" (4 mil) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.
- B. MAPEI Mapeguard UM
1. Description: Premium-performance, lightweight, waterproofing and vapor-pressure-equalizing underlayment membrane that provides crack suppression for use under ceramic tile and stone installations as well as underneath self-leveling engineered cement products. Provides reduced "roll memory" and is also "fast track ready" over green concrete and mortar beds.
 2. Waterproofing seaming membrane:
 - a. Provide with Mapeguard ST

2.07 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

SECTION 093013 - CERAMIC TILING - THIN-SET^{H2M}

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation; Keraflex Super
 - c. TEC; a subsidiary of H. B. Fuller Company.
 2. Provide prepackaged, dry-mortar mix containing dry, redispersable, vinyl acetate or acrylic additive to which only water must be added at Project site.
 3. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.
 4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
- B. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
1. Applications: Where indicated on drawings.
 2. Products:
 - a. Custom Building Products; EBM-Lite Epoxy Bonding Mortar: www.custombuildingproducts.com/#sle.
 - b. LATICRETE International, Inc; LATICRETE LATAPOXY 300 Adhesive: www.laticrete.com/#sle.
 - c. MAPEI Corporation; Kerapoxy 410
 - d. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: www.merkrete.com/#sle.

2.08 GROUT MATERIALS

- A. Polymer-Modified Tile Grout: ANSI A118.7.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation; Ultracolor Plus FA
 - c. TEC; a subsidiary of H. B. Fuller Company.
 2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersable form, prepackaged with other dry ingredients.
 3. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.
- B. Water-Cleanable Epoxy Grout: 1, ANSI A118.3 100 percent solids, non-sag/non-slump, chemical resistant with color-coated quartz and a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D. Provide at all Toilet Room Floors, Locker Rooms, and locations indicated on the Drawings.
1. Basis-of-Design Product: MAPEI Corporation; Kerapoxy CQ or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. TEC; a subsidiary of H. B. Fuller Company.
 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.
- C. Grout for Pre-grouted Tile Sheets: Same product used in factory to pre-grout tile sheets.

2.09 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 - METAL BUILDING SYSTEMS.
1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

SECTION 093013 - CERAMIC TILING - THIN-SET **H2M**

2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. Multi-part, Pourable Urethane Sealant for Use T: ASTM C920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.
 1. See Section 079200 - JOINT SEALANTS for additional information.

2.10 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 or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A666, 300 Series exposed-edge material.
- C. Decorative Color Coated Tile Edge and Finishing Profiles: Schluter®-RONDEC, symmetrically rounded visible surface with 1/4" radius bullnose profiles with integrated trapezoid-perforated anchoring leg and integrated grout joint spacer; extruded aluminum with color-coated finish color and height as selected by the architect. Provide inside and outside corner connectors and special shapes for a complete installation.
- D. Temporary Protective Coating: 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 (49 to 60 deg C) 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.
 - a. MAPEI Corporation; "UltraCare" Grout Release
- E. 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.
 1. Products:
 - a. MAPEI Corporation; "UltraCare" Everyday Stone, Tile & Grout Cleaner
- F. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bonsal American; an Oldcastle company; Grout Sealer.
 - b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
 - c. C-Cure; Penetrating Sealer 978.
 - d. Custom Building Products; Grout and Tile Sealer.
 - e. Jamo Inc.; Penetrating Sealer.
 - f. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
 - g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
 - h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
 - i. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

2.11 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

3.01 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 coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Protect surrounding work from damage.
- C. Remove any curing compounds or other contaminants.
- D. Vacuum clean surfaces and damp clean.
- E. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1a and is sloped 1/4 inch per foot (1:50) toward drains.
- F. Blending: For tile exhibiting color variations, 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.

- G. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.03 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic 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.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - c. Tile floors composed of rib-backed tiles.
- 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. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
 - 4. For Plank type tiles, install staggered in a "running bond" brick joint pattern with no more than 33 % overlap to prevent lippage and warping.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/8 inch (1.6 mm).
 - 2. Porcelain Floor Tile: 3/16 inch (4.8 mm) minimum.
 - 3. Paver Tile: 1/8 inch.
 - 4. Glazed Porcelain Wall Tile: 1/8 inch (4.8 mm).
 - 5. Decorative Thin Wall Tile: 1/8 inch (1.6 mm).
 - 6. Quarry Tile: 1/4 inch (6.3 mm)
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

SECTION 093013 - CERAMIC TILING - THIN-SET^{H2M}

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 - JOINT SEALANTS.
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
 2. Do not extend waterproofing or crack isolation membrane under thresholds set in latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on waterproofing or crack isolation membrane with elastomeric sealant.
- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
- K. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.04 TILE BACKING PANEL INSTALLATION

- A. Install cementitious backer units and treat joints according to ANSI A118.11 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.

3.05 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.06 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. For epoxy grout installations utilize recommended grout haze cleaner as recommended by the tile manufacturer. 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 and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with 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.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed. After seven days, cover areas subject to construction traffic with heavy cardboard.

- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.07 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Tile Installation F115A: Thin-set mortar; epoxy grout; TCNA F115A.
 - a. Tile Type: Glazed Porcelain floor tile.
 - b. Thin-Set Mortar: Latex- portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.
 - 2. Tile Installation F122A: Thin-set mortar on waterproof membrane; TCNA F122A.
 - a. Tile Type: Glazed Porcelain floor tile.
 - b. Thin-Set Mortar: Latex- portland cement mortar.
 - c. Grout: Polymer-modified sanded unsanded grout.
- B. Interior Wall Installations, Metal Studs or Furring:
 - 1. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCNA W244F.
 - a. Tile Type: Glazed Porcelain wall tile.
 - b. Thin-Set Mortar: Latex- portland cement mortar.
 - c. Grout: Polymer-modified sanded grout.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems with accessories and trims for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices.
- C. Exposed Grid Suspension Systems - 15/16 inch
- D. Acoustical Sealants.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.05 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.06 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. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component including decorative moldings, equal to 2 percent of quantity installed.

1.07 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.

1.08 FIELD 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. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.09 WARRANTY

- A. Provide manufacturer's 30-year limited systems warranty covering defects in materials and / or factory workmanship for ceiling panels and suspension systems.
- B. Provide manufacturer's 10-year limited warranty covering sagging and warping defects caused by materials or factory workmanship for Humidity and Moisture-resistant ceiling systems.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE 7.
- B. Surface-Burning Characteristics: Comply with ASTM E84 testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.

2.02 ACOUSTICAL PANELS, GENERAL

- A. Low-Emitting Materials: Acoustical panel ceilings 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. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.
- D. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- E. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance 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 according to ASTM E795.
- F. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.03 ACOUSTICAL PANELS (ARMSTRONG - ULTIMA)

- A. Basis-of-Design Product Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. Armstrong World Industries, Inc.: Ultima 1911A.
 2. Architect approved equivalent.
- B. Classification: Provide panels complying with ASTM E1264 for type, form, and pattern as follows:
 1. Type and Form: Type IV, mineral base with factory-applied latex paint; Form 2, water felted; with Durabrite acoustically transparent membrane. .
 2. Pattern: Eas indicated by manufacturer's designation.
- C. Color: White.
- D. Texture: Fine
- E. Light Reflectance (LR): ASTM E1477; Not less than 0.88.
- F. Noise Reduction Coefficient (NRC): ASTM C423; Not less than 0.80.
- G. CAC: ASTM C1414; Not less than 35.
- H. Articulation Class (AC): ASTM E1111/E1111M; Classified with UL label.
- I. Edge/Joint Detail: Beveled Tegal.
- J. Thickness: 3/4 inch (19 mm).
- K. Modular Size: 24 by 24 inches (610 by 610 mm).
- L. Grid size: 15/16 inch
- M. Weight: 1.05 psf.
- N. Insulation Value: R Factor: 2.2 (BTU Units) / 0.39 (Watt Units).
- O. Fire Performance: Class A (UL)
- P. Mold/Mildew Inhibitor: Front and Back of each panel shall be treated with BIOBLOCK, paint containing a biocide to inhibit / retard the growth of mold or mildew, ASTM D3273.
- Q. Humidity/Sag Resistance: Humiguard Plus protection.
- R. VOC Emissions: GREENGUARD Gold Certified, ANSI/GBI Green Building Assessment Protocol, LEED WELL Building Standard, and UL 2818 Low Chemical Emissions UL.COM/GG.
- S. Recycled Content: 87%

2.04 ACOUSTICAL PANELS (ARMSTRONG - CALLA)

- A. Basis-of-Design Product Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Armstrong World Industries, Inc.: Calla 9/16 inch Tegular.
 - 2. Architect approved equivalent.
- B. Classification: Provide panels complying with ASTM E1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type IV, mineral base with factory-applied latex paint; Form 2, water felted; with Durabrite acoustically transparent membrane. .
 - 2. Pattern: E or as indicated by manufacturer's designation.
- C. Color: White.
- D. Texture: Smooth
- E. Light Reflectance (LR): ASTM E1477; Not less than 0.85.
- F. Noise Reduction Coefficient (NRC): ASTM C423; Not less than 0.85.
- G. Ceiling Attenuation Class (CAC): ASTM C1414; Not less than 35.
- H. Articulation Class (AC): ASTM E1111/E1111M; Classified with UL label: 170
- I. Edge/Joint Detail: Square Tegular.
- J. Thickness: 1 inch (25.4 mm).
- K. Modular Size: 24 by 24 inches.
- L. Grid size: 9/16 inch
- M. Weight: 1.0 lb/sq. ft.
- N. Insulation Value: R Factor: 2.9 (BTU Units) / 0.445 (Watt Units).
- O. Fire Performance: Class A (UL)
- P. Mold/Mildew Inhibitor: Front and Back of each panel shall be treated with BioBlock, paint containing a biocide to inhibit / retard the growth of mold or mildew, ASTM D3273.
- Q. Humidity/Sag Resistance: Humiguard Plus protection.
- R. VOC Emissions: GREENGUARD Gold Certified, ANSI/GBI Green Building Assessment Protocol, LEED WELL Building Standard, and UL 2818 Low Chemical Emissions UL.COM/GG.
- S. Recycled Content: up to 76% total recycled content.

2.05 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

- B. 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 C635/C635M.
 - 1. High-Humidity Finish: Comply with ASTM C635/C635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, 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 A641/A641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5-mm-) diameter wire.
- E. Hanger Rods or Flat Hangers: 1/4 inch diameter Rod or 1 inch x 1/8 inch min. Flat Bars, Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04 inch (1 mm) thick or as indicated on the drawings, galvanized-steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch (8 mm) diameter bolts.
- G. Cold Rolled Channel: 1 1/2 inch deep, 16 MSG cold rolled steel with protective zinc coating. Tie to supporting structure with 12 SWG galvanized wire ties. Install at 4'-0" o.c. maximum or as indicated on the drawings.
- H. Drop Clips: 18-gauge galvanized steel with key hole slot, or other configuration approved by New York City Dept. of Buildings for connection of ceiling suspension members to carrying channels.
 - 1. Drop clips shall be of length required for indicated ceiling height, and to provide clearances for lighting fixtures, mechanical equipment, and other items above the ceiling. Where necessary because of limited clearance, provide clips that connect runners tight to the bottom of carrying channels.
- I. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- J. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- K. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place. Conform to "Code of Practices for Acoustical Ceiling System Installations" by CISCA - Ceilings & Interior Systems Contractors Association.
- L. Hold-Down Clips: Provide manufacturer's standard hold-down clips (Armstrong CHDC, Rockfon 490.00, or approved equivalent) spaced 24 inches (610 mm) o.c. on all cross tees. At exterior locations provide Exterior Hold Down Clips in size determined by the panel thickness (Armstrong EHDC, Rockfon 490.00, or equal).
- M. Retention Clips: Provide Armstrong 414 "butterfly" style Retention Clips in Gymnasium and Activity spaces. Install as recommended by the manufacturer to secure each panel and not less than four (4) clips per panel. Note: clips shall be removable for access by twisting the wings of the clip.

2.06 METAL SUSPENSION SYSTEM - 15/16 GRID

- A. Basis-of-Design Product Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Armstrong World Industries, Inc.: Prelude plus XL and 15/16 Co-extruded CLEAN ROOM.
 - 2. CertainTeed Corp.
 - 3. Chicago Metallic Corporation.
- B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 15/16-inch (24 mm) wide metal caps on flanges.
 - 1. Structural Classification: Heavy-duty system.
 - 2. End Condition of Cross Runners: butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Grid and Cap Material: Hot-dip galvanized steel with Aluminum cap.
 - 5. Cap Finish:
 - a. White for acoustical panel installations.
 - b. Color as selected by the Architect for the 360 Painted Grid system.
- C. Suspended Ceiling Grid Moldings: StyleStix TM - Rigid PVC; Sag, mold, mildew and bacteria resistant; snap-on grid and perimeter moldings (Items #1310, 1311 and 1312) in lengths required. System connects to a standard 15/16" grid suspension system with wall molding profile. The StyleStix system shall have the following physical characteristics:
 - 1. Dimensions: 1 1/2 inch wide x 3/4 inch deep x 72 inch long (#1310)
 - 2. Sag Resistance: HumiGuard Plus.
 - 3. Fire Rating: Class A
 - 4. Anti-microbial: Mold, Mildew and Bacteria resistant
 - 5. Durability: Soil, scratch and impact resistant
 - 6. Material: PVC
 - 7. Finish: White, paintable surface.
 - 8. Warranty: Limited Lifetime manufacturer's warranty.

2.07 METAL EDGE MOLDINGS AND TRIM

- A. Basis-of-Design Product : Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Armstrong World Industries, Inc. 15/16 inch edge Angles, Moldings and Trims compatible with the grid specified. Provide gasketed CLEAN ROOM Edge Moldings and Trim where CLEAN ROOM grids are specified.
 - 2. Chicago Metallic Corporation.
 - 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
- 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. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
- C. Extruded Aluminum, Sheet-Metal Edge Moldings and Trim: Axiom Trim type and profile indicated.

2.08 ACOUSTICAL SEALANT

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 1. Acoustical Sealant for Exposed and Concealed Joints
 - a. Pecora Corporation ; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation: SHEETROCK Acoustical Sealant.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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.

3.03 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C636/C636M and seismic design requirements indicated, according to 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 the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. 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.
 7. Do not attach hangers to steel deck tabs.
 8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 9. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
 10. 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 post-installed 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 (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
 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. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 - b. Install panels with pattern running in one direction parallel to short axis of space.
 2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: a qualified testing agency to perform tests and inspections and prepare test reports.

- B. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
 - 1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
 - a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and post-installed anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two post-installed anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
 - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- C. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.05 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

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Factory-finished wood flooring.
 - 2. Sound control underlayment.

1.03 REFERENCES

- A. ASTM E648 –Standard Test Method for critical Radiant Flux of Floor Covering systems using a radiant heat energy sources 0.45 watts/cm² or greater, Class 1.
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- C. ASTM F710 - Practice for Preparing Concrete Floors.
- D. ASTM F2170 - Standard test method for determining relative humidity in concrete slabs using In-Situ-probes.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor assembly and accessory. Include plans showing pattern layout(s), details, transitions and attachments to other work. Include expansion provisions and trim details.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and finishes available for wood flooring.
- D. Installer Certification: Submit a list of at least three installations successfully completed within the past year requiring the same general degree of installation expertise.

1.05 MAINTENANCE

- A. Initial Care: Remove any adhesive residue or petroleum based products with the appropriate cleaner (low odor mineral spirits). Urethane adhesive should be removed with the appropriate urethane adhesive cleaner. Thoroughly clean the floor with manufacturer approved Hardwood and Laminate Floor Cleaner. Dampen a CLEAN cloth with the materials, do not soak. DO NOT USE dirty mops or those that contain the residue of dust attracting compounds. Dust mop the floor as normal, misting the materials periodically while proceeding throughout the installation.
- B. Routine Care (daily) - Clean the floor as needed with manufacturer's recommended Hardwood and Laminate Floor Cleaner.
- C. Periodic Care (weekly-monthly) - Dust mop the floor as recommended under daily care. Buff the floor using a medium high speed buffer (175-750 RPM) and white/buff colored buffing pads. Apply manufacturer's recommended Hardwood and Laminate floor cleaner to the surface in the path of the buffing machine using a misting bottle while proceeding throughout the installation.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- 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.
- B. Wood Flooring: Equal to 10 percent of amount installed for each type of wood flooring indicated.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Installer: Shall be experienced in the wood and/or vinyl tile flooring industry and shall have a minimum of five (5) years experience in the installation of similar products
- C. Build mockup of typical flooring area including base and shoe moldings.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Approved mockups may not become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver the flooring to a preferred 35-55% relative humidity job site in unopened cartons. Protect flooring from exposure to moisture. Moisture producing activities such as drywall, concrete, masonry, painting and grouting must be complete and cured prior to the delivery of wood flooring.
- B. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.09 PROJECT CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
 - 1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

1.10 WARRANTY

- A. Performance Plus Engineered Hardwood Flooring Warranties:
 - 1. Provide manufacturer's 10-Year Limited Commercial Warranty.
 - 2. Full Lifetime Structural Integrity Warranty.
 - 3. Full lifetime adhesive bond warranty is also offered when using Armstrong approved recommended adhesives

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Wood floors shall comply with requirements of FloorScore Standard.

2.02 FACTORY-FINISHED WOOD FLOORING

- A. Certified Wood: Provide wood flooring produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - 1. Armstrong Performance Plus Commercial Hardwood Plank Flooring
 - 2. Architect Approved Equivalent.
- C. Product Information:
 - 1. Species: Cherry.
 - 2. Thickness: 3/8 inch.
 - 3. Wear Layer: 1/12 inch.
 - 4. Width: 5 inch
 - 5. Lengths: Vary from 9 inch to 48 inch.
 - 6. Construction: Five ply.
 - 7. Edge Style: Lock & Fold with micro-beveled edges and ends.
 - 8. Pattern: Rectangular.
 - 9. Finish: Acrylic Infused. Permion Urethane Finish.
 - a. Color: As selected by Architect from manufacturer's full range.
 - b. Gloss: Low Gloss
 - 10. Fire Ratings: ASTM E648 Critical Flux of 0.45 watts/cm2 or greater, Class 1.

2.03 SOUND CONTROL UNDERLAYMENT

- A. Sound Control Underlayment: Sound reducing underlayment consisting of impact-absorbing materials. Minimum Impact Insulation Class (IIC) of 50 when tested according to ASTM E492.

2.04 ACCESSORY MATERIALS

- A. Vapor Retarder: ASTM D4397, polyethylene sheet not less than 6.0 mils thick.
- B. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.
- C. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.

- D. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines: Wood Flooring."
- E. Thresholds and Saddles: To match wood flooring. Tapered on each side. Vertical face shall not exceed 1/4" and bevels shall have a 30 degree maximum slope
- F. Reducer Strips: To match wood flooring. 2 inches minimum wide, tapered, and in thickness required to match height of flooring.
- G. For moisture remediation on concrete slabs tested with ASTM method F 1869 exceeding maximum Hardwood requirement of 3 lbs/1000 ft²/24 hr period, not to exceed 12 lbs/1000 ft²/24 hr Moisture Vapor Emission Rate (MVER) use Armstrong VapArrest (S-135) Professional Moisture Retardant System. For Glue down installations over S-135 use the recommended Urethane adhesives only.
 - 1. Floating installations can be installed over S-135.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - 1. Verify that new slab cure is a minimum of 30 days, preferably 60 days.
 - 2. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Perform anhydrous calcium chloride test per ASTM F1869 or Internal Relative Humidity Test ASTM F2170 (In-Situ Probe Test) must be performed for warranty consideration.
 - b. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1000 sq. ft. in 24 hours.
 - c. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - d. In-Situ Probe test not to exceed 75% RH. If vapor transmission rate exceeds 3 lbs/1000 square feet/24hrs and is less than 12 lbs./1000 square feet/24hrs or RH is excess of 75%. Apply Armstrong VapArrest Moisture Retardant System as directed.
- D. Wood Subfloors
 - 1. Must be dry, clean, structurally sound, flat to within 3/16" in 10 ft., well nailed and/or glued, free of voids and with flat joint alignment.
 - 2. The wood subflooring materials should not exceed 13% moisture content. Using a reliable wood moisture meter, check the moisture content of the subfloor.
 - 3. Ensure that all nail heads are set flush with or below surface.
 - 4. Must be sanded smooth to remove varnish, high edges, chips, or other contaminants. Use thick 5/8" (16mm) or 3/4" (19mm) APA-CDX grade underlayment plywood or equivalent.
 - 5. Allow 1/8"-1/4" (3,2-6,4mm) expansion space between sheets with staggered joints. Leave 3/4" (19mm) minimum expansion space at all vertical obstructions
- E. All Subfloors

1. Coordinate work with that of other trades prior to installation so that no discrepancies exist with the installation of doors, frames, saddles, floor drains or any materials that would interfere in any other way
2. Notify Architect of moisture test results and any unsatisfactory conditions. Do not begin installation until unsatisfactory conditions have been corrected. Beginning the installation means that the substrate and job site conditions have been accepted as suitable. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the sub-floor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.02 PREPARATION

- A. Concrete Slabs: Scour all concrete surfaces, except when using floating method, using 3 ½ open coat (20 grit) sand paper. Grind high spots and fill low spots to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
 1. Use flooring manufacturer approved trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
 2. Self-leveling underlayments shall be sufficiently dry as evidenced by a moisture test and be sanded smooth before installing floor.
- B. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- C. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring".
- B. Provide expansion space at walls and other obstructions and terminations of flooring of not less than 3/4 inch or as recommended by the flooring manufacturer.
- C. Vapor Retarder: Comply with NOFMA's "Installing Hardwood Flooring" for vapor retarder installation and the following:
 1. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.
- D. Sound Control Underlayment: Install over vapor retarder in accordance with manufacturer's written instructions.
- E. Engineered-Wood Flooring: Locking/Floating.
- F. Floating floor will utilize manufacturer's Quiet Comfort Premium foam underlayment and manufacturer's Hardwood & Laminate Flooring Adhesive as recommended by the manufacturer.
- G. Spread adhesive using recommended trowel per manufacturer's instructions.
- H. Always install while adhesive is still wet.
- I. Spread adhesive only over surface that can be finished within working time of the adhesive.

- J. Scribe, cut and fit to permanent fixtures, columns, walls, partitions, pipes, outlets and built-in furniture and cabinets leaving the manufacturer's required expansion space. Install the flooring with adhesives, tools and procedures in strict accordance with the manufacturer's written instructions. Follow the recommended adhesive trowel notching, open times and working times. If mechanical fastening the flooring follow the correct fastener and staples as provide in the manufacturer's instructions.
- K. Install trim, molding and transition strips per manufacturer's installation instructions.

3.04 PROTECTION

- A. Protect finished floor from abuse by other trades using heavy kraft paper or equivalent. Do not use plastic sheet or film that might cause condensation. Keep traffic out of spaces and areas where flooring is being installed until adhesive has set. Light foot traffic after 10-12 hours. Normal traffic after 24 hours.
 - 1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Recoating of existing wood Classroom floor as indicated on the drawings.
 - a. Touch-up of damaged game lines with game line paint.
 - b. Two (2) coats of Wood Floor Finish.
 - c. Removal and reinstallation of floor accessories as required.
 - 1) Complete removal of existing finish at wood Classroom floor and complete refinishing as indicated on the drawings:
 - (a) Three (3) coats of Wood Floor Sealer
 - (b) Layout and repainting of game lines with new game line paint.
 - (c) Two (2) coats of Wood Floor Finish
 - (d) Removal and reinstallation of floor accessories as required.
 - 2) At bleacher locations the bleachers shall be in their fully retracted position during recoating or refinishing process. Refinishing of floor immediately beneath retracted bleachers is not required.
 - 3) Protect bleachers from products such as solvents used as part of refinishing work that may be detrimental to bleacher components.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Detailed technical product data for all products.
 - 2. Material Safety Data Sheets for all products.
 - 3. Submit written statements of compatibility from manufacturers if products by different manufacturers are applied.
- B. Documentation of existing conditions:
 - 1. Field verify and document existing conditions, including all dimensions and layout information. Provide scaled and accurate drawing(s) to Owner.
 - 2. Provide photo documentation of areas of damage (gouges, mars, split boards, etc.) present in the existing floor that the Contractor does not expect would be remedied by refinishing work.
- C. Samples:
 - 1. Submit samples for each type of finish, demonstrating full range of variation to be anticipated in finished work.
 - 2. Provide three (3), 12 inch long samples for Architect approval prior to ordering any materials.
- D. Quality Control Submittals:
 - 1. Manufacturer's installation and finishing instructions.
 - 2. Provide at least three (3) project references of similar work scope with contact information to the Architect.
 - 3. Layout Plans and description of work methodology.
 - 4. Provide colored dimensioned plans of proposed graphics, Logos and striping to be painted on floor.

- a. Note locations of colors to be used and submit color samples.
- b. Provide field verified locations of penetrations (including electrical boxes, volleyball standards, etc.) and basketball backstops.
- c. Allow for three submittals, to allow Owner to adjust game line layouts colors.
- 5. Contract Closeout Submittals:
 - a. Operations and Maintenance Data:
 - 1) Manufacturer's maintenance recommendations.
 - 2) List of maintenance products recommended by flooring manufacturer and contact information as necessary for Owner to obtain products.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Contractor shall have not less than 10 years of successful experience in finishing/refinishing wood floors.
 - 2. Contractor shall provide not less than 5 references complete with contact information necessary for Owner's Construction Representative and Architect to verify reference.
 - 3. Contractor shall be an accredited member of the Maple Floor Manufacturers Association MFMA (PUR).
- B. Manufacturers Requirements and Recommendations:
 - 1. The requirements and recommendations of specific products applied during the refinishing process are to be followed in all respects.
 - 2. All products are to be applied at coverage rates recommended by the manufacturer.
 - 3. Do not thin or reduce products unless Manufacturer's instructions specifically direct this to be required.
 - 4. Compatibility of all materials for proper adhesion and performance that are applied during the refinishing process must be verified by the Contractor prior to any application. Contractor shall provide written statements from Manufacturers indicating compatibility to Owner. Contractor shall apply test areas to check for proper adhesion of materials and to verify previous coatings are not attacked by subsequent coatings or finishes as required. If poor adhesion or attack of coatings occurs, the Contractor shall be responsible for all necessary remedies at their own expense.
- C. Preinstallation Conference:
 - 1. Conduct conference at project site for the purpose of a final review of the contract documents, manufacturer's instructions, and materials to be used. Contractor shall bring copies of instructions and recommendations from manufacturer and distribute to those in attendance.
 - 2. Attendance: The contractor, other trades or manufacturers representatives as deemed appropriate by the contractor, and the Owner, Owner's Construction Representative, and Architect.
 - 3. Examine actual conditions of environment and existing substrates to determine whether they are satisfactory for work to proceed.
 - 4. Examine the contract documents and compare with manufacturer's current printed installation recommendations and instructions. Notify the Architect of any discrepancies or conflicts prior to execution of any work to receive resolution.

1.05 DELIVERY, STORAGE AND HANDLING

- A. All materials and products to be applied shall be delivered to the job site unopened in manufacturer's original packaging and containers.
- B. All products delivered to the job site must be dated within the shelf-life approved by the manufacturer. Contractor will ascertain that the installation shall be completed prior to printed expiration date.

- C. Delivery tickets for all materials shall be provided to the Owner, Owner's Construction Representative, and Architect upon request.
- D. Store materials at locations within the building as directed by the Owner, Owner's Construction Representative, and Architect.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements: Contractor shall coordinate with the Owner to maintain ambient temperature between 65 and 70 degrees F during entire refinishing process.
- B. Do not apply any coatings if temperatures or humidity levels are not within limits set by the approved product manufacturer.
- C. Follow all manufacturer recommendations regarding handling of dust and mineral and oil-soaked rags. All materials that may pose hazard of spontaneous combustion shall be removed from the building and properly disposed of by the Contractor on a daily basis.

1.07 WARRANTY

- A. Furnish manufacturer's standard warranty. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have in accordance with the Contract Documents and Agreements for this project.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers of the products indicated as acceptable in subsequent paragraphs are as follows. Other products or manufacturers may be considered by the Owner/Architect prior to bidding in accordance with Section 012500 - PRODUCT SUBSTITUTION PROCEDURES.
 - 1. Sika Corporation (Sika U.S.) – Lyndhurst, NJ
 - 2. Bona Kemi USA, Inc. – Aurora, CO
 - 3. Hillyard Industries, Inc. – St. Joseph, MO
 - 4. PoloPlaz, Inc. – Jacksonville, AR
- B. Wood Floor Sealer and Wood Floor Finish products selected for use by the Contractor shall be by a single manufacturer. Other products and accessories selected for use by the Contractor must be approved by the manufacturer of the sealer and finish products used on the Project.

2.02 WOOD FLOOR SEALER

- A. Description: Maple Floor Manufacturers Association approved, low VOC (350 g/L VOC maximum) oil-modified sanding sealer formulated to seal wood and provide surface for finish coating.
- B. Acceptable Products:
 - 1. Sikafloor WP-11.1 Sports Floor Sealer.
 - 2. Bona Sport Seal 350.
 - 3. Hillyard 350 Wood Seal.
 - 4. PoloPlaz Low VOC Sealer.

2.03 WOOD FLOOR FINISH

- A. Description: Maple Floor Manufacturers Association approved, low VOC (350 g/L VOC maximum) oil-modified urethane varnish formulated to provide durable, solid and protective film.
- B. Acceptable Products:
 - 1. Sikafloor WP-8.1 Sports Floor 350 Finish.
 - 2. Bona Sport Poly 350
 - 3. Hillyard 350 Gym Finish
 - 4. PoloPlaz Magnum Low VOC

2.04 VENT COVE BASE

- A. Description: Johnsonite 4" (vertical) x 3" (horizontal) vent cove base. Homogenous composition of 100% synthetic rubber, additives and colorant with vertical venting at back side of vertical surface to allow air circulation. Provide prefabricated outside outside corners. Provide with manufacturers recommended adhesive for existing wall surface.
- B. Color: Match color of existing vent cove base.

2.05 EXISTING STEEL BASE

- A. Existing Steel angle base shall be prepared to accept new compatible primer and high performance paint finish in color selected by the architect.
- B. Provide the following Paint system for the existing Steel Base Finish:
- C. Epoxy-Modified Latex System:
 - 1. Prime Coat: Primer, rust-inhibitive, water based, MPI #107: S-W Pro-Cryl Universal Primer, B66-310 Series, at 2.0 to 4.0 mils dry, per coat.
 - 2. Intermediate Coat: Epoxy-modified latex, interior, gloss matching topcoat.
 - 3. Topcoat: Epoxy-modified latex, interior, gloss, (Gloss Level 6), MPI #115/MPI #115X-Green: S-W Pro Industrial Water based Catalyzed Epoxy Gloss, B73-300 Series, at 2.0 to 4.0 mils dry, per coat.

2.06 FINISHING ACCESSORIES

- A. As recommended by manufacturer and required by installer for complete installation, including but not limited to:
 - 1. Lambswool and/or synthetic foam applicators.
 - 2. Tack rags with manufacturers recommended cleaner(s).
 - 3. Tapes for game lines masking.
 - 4. Screens and sanding paper or pads in grades as recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine environment, substrates and working conditions.
 - 1. Inspect floor with Owner's Construction Representative to identify split boards or other damage to floor surface, walls and base materials requiring repairs beyond the scope of refinishing.
 - 2. Verify that surfaces and working conditions are in accordance with manufacturer's recommendations.

3. Correct unsatisfactory substrates and working conditions before proceeding with applications.

3.02 PREPARATION

- A. Remove all miscellaneous debris from floor, including but not limited to: gum, paints and masking and marker tapes.
- B. Remove all existing cove and floor base material around perimeter of wood floor(s). Base materials shall be handled as follows:
 1. Floor base shall be salvaged and reinstalled. Provide temporary removable tags for reinstallation of base sections in same locations upon completion of the Floor finishing work.
- C. Remove existing coverplates at all floor sleeve locations and existing thresholds at all doorways, protect, store and catalogue for reinstallation upon completion of the floor re-finishing work. Temporary cover floor openings flush with floor surfaces to preclude tripping hazards to workers.
- D. Countersink exposed fasteners to allow refinishing and avoid damage to tools and equipment.
- E. Close off all ventilation return ducts and grilles to prevent airborne contaminants from being drawn through ventilation systems. Schedule this work and closure of ventilation systems required with Owner's Construction Representative.
- F. Post 11"x17" signs on all doors into the work area indicating "Floor Refinishing in Process, DO NOT ENTER".

3.03 PROTECTION DURING WORK

- A. Protect floor from moisture at all times.
- B. Do not permit traffic on floor after sanding and before completion of finish system, except for installers applying paints or finishes.
- C. Protect sanded floor with heavy kraft paper or other suitable covering to provide access for application of first coats. Do not use cover materials that may trap moisture vapor and cause condensation to form under the covering.
- D. Prohibit nonessential traffic on floors until work is complete. In all cases comply with manufacturer's curing and environmental requirements prior to allowing foot traffic on re-finished floor surfaces.
- E. Provide notification to Owner and Owner's Construction Representative when both light foot traffic will be permitted and when regular athletic activities may be re-introduced.

3.04 COMPLETE REFINISHING PROCESS

- A. Initial Sanding and Finish Removal:
 1. Schedule sanding operations such that the first coat of sealer is completely applied on the same day that sanding is completed.
 - a. Machine-sand existing flooring down to bare wood with 3 grades of sandpaper (course, medium, fine) to remove offsets and nonlevel conditions, ridges, cups, and sanding machine marks which would be noticeable in any manner after finishing. Screen floor using orbital disc sander with fine grit screen after sanding.

- b. Use edge sander for areas of floor that cannot be reached with drum sander. Use hand sanders for areas that cannot be reached with edge sander.
 - c. Floor shall be completely smooth after initial sanding process. Contractor shall provide additional cuts if floor is not smooth after three (3) cuts.
- B. Dust Removal:
 - 1. Thoroughly vacuum entire floor and areas around, including doors, windows, sills and corners to remove dust.
 - 2. Perform final dust removal using a tack rag. Remove all traces of dust from floor, doors, window sills, overhead structures, diffusers grilles and ceilings etc.
 - 3. Inspect floor to ensure that surfaces are free of drum stop marks, gouges, streaks or shiners, are clean and completely free from sanding dust, and are acceptable for finishing in accordance with the manufacturer's instructions.
- C. Seal Coats:
 - 1. Do not begin application of seal coating until dust removal is complete.
 - 2. Apply first coat of sealer on the same day that sanding is completed.
 - 3. Apply coats within the time limits for recoating recommended by manufacturer and at manufacturers recommended rates.
 - 4. Application:
 - a. Apply first coat of sealer to floor per manufacturer's instructions.
 - b. Allow sealer to dry a minimum of 12 hours before proceeding unless manufacturer recommends otherwise. Allow additional dry time if recommended by manufacturer or if ambient conditions require.
 - c. Perform a buffing/sanding operation over entire floor with an orbital buffer and fine grade screen sanding disc.
 - d. Remove dust from floor using vacuum and tack rag as described under Dust Removal.
 - e. Apply Game Lines and Markings after first seal coat.
 - f. Apply second and third coats of sealer to floor per manufacturer's instructions, allowing sealer to dry and performing buffing/sanding operation and dust removal after each seal coat.
- D. Painting of Lines and Markings:
 - 1. Do not begin application of marking tape until dust removal is complete.
 - 2. Game lines and markings are to generally match layout and quantity of current game courts. Supplemental lines and markings to match those as may currently exist on floor prior to sanding work are also to be reapplied.
 - 3. Prior to field layout of lines the Contractor shall recommend adjustments to court lines layout, markings and colors as necessary to update courts to meet current rules and recommendations of Association having jurisdiction. Owner is to have final approval of layout, markings and colors.
 - 4. Game lines layouts shall be accurate relative to locations of existing floor sleeve locations.
 - 5. All lines to be straight with sharp edges in colors as selected by Owner.
 - 6. Roll or rub marking tape firmly to floor surface prior to painting. Bleeding or creep of paint at edges will not be acceptable and shall be removed and re-installed to the satisfaction of the Owner.
 - 7. Feather paint application as required to provide a smooth appearance.
 - 8. Intermix containers to ensure uniformity of color if more than one container is required. If custom color or colors are required mix custom color in quantity adequate for the entire installation.
 - 9. Allow paint to dry a minimum of 24 hours before proceeding with additional work on the surfaces. Allow additional time if recommended by the finish or paint manufacturer or if ambient conditions require.

E. Finish Coat:

1. Apply coat within the time limits for coating recommended by the manufacturer. If time limits are exceeded, provide additional sanding/buffing and dust removal as required by manufacturer.
2. Do not commence application of finish coat until dust removal is complete.
3. Do not allow any coating materials to puddle.
4. Typically apply finish coat in direction of wood grain.
5. Apply finish to floor per manufacturer's instructions and rates of application.
6. Allow finish to dry a minimum of 72 hours and verify that dry coating conditions exist prior to permitting any foot traffic on the surfaces.

3.05 RE-COATING PROCESS

- A. Clean floor surface of dirt, dust and mop treatments using a neutral cleaner and allow the floor to dry thoroughly.
- B. Perform a buffing/sanding operation with an orbital buffer and fine grade screen sanding disc as necessary to remove glossed surface and to allow proper adhesion of new finish coat to existing finish.

END OF SECTION

PART I GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Luxury Solid Vinyl Tile (LVT)
 - 2. Edge Strips.
 - 3. Related Accessories.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 033000 - Cast-In-Place Concrete
 - 2. Section 090561.13 - Moisture Vapor Emission Control
 - 3. Section 096513 - Resilient Base and Accessories

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. RFCI Handbook.
- C. ASTM F710 "Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring".
- D. ASTM F1700 "Standard Specification for Solid Vinyl Floor Tile".

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements
- C. Product Data: Manufacturer's technical data for each type of resilient flooring and accessory.
- D. Samples for Initial Selection Purpose: Manufacturer's standard and custom color charts in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available for each type of resilient and rubber flooring required. The Architect shall select the colors, patterns, and textures from the manufacturer's complete range of standard and custom colors.
- E. Verification Samples: Provide three (3) samples, 8" long by width to be furnished of each different color and/or size selected for incorporation into the project.
- F. Maintenance Instructions: Submit two (2) Copies of manufacturer's recommended maintenance practices for Luxury Vinyl Tile flooring and accessories.

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturers' recommendations and/or industry standards shall perform all work of this section.

- B. Provide each type of Luxury Vinyl Tile flooring and accessories as produced by a single manufacturer, including recommended primers, adhesive, sealants, and leveling compounds. All accessory products shall meet the requirements for the manufacturer's warranty to be valid.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Store and install only where space temperatures are within resilient materials manufacturer's specified range. Thereafter, maintain resilient materials manufacturer's specified environmental conditions.

1.07 PROJECT CONDITIONS

- A. Maintain minimum temperature of 65-degrees F in spaces to receive luxury vinyl tile for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55-degrees F in areas where work is completed. Store luxury vinyl tile flooring materials in spaces where they will be installed for at least 48 hours before beginning installation.
- B. Install luxury vinyl tile flooring and accessories after other finishing operations, including painting, have been completed. Do not install luxury vinyl tile flooring over concrete slabs until the installation of the moisture vapor emission control membrane is complete.

1.08 MANDATORY TESTING

- A. Hardened concrete to receive resilient flooring shall be tested using anhydrous calcium chloride test for measurement of vapor emissions.
 - 1. Three (3) tests shall be required for initial 2,000 sq. ft. and one (1) additional test for each 1,000 sq. ft. of floor over 2,000 sq. ft.
 - 2. All tests must be done simultaneously.
 - 3. Resilient flooring shall not be installed unless tests meet or exceed manufacturer's recommendations for their adhesive and flooring.
 - 4. Test must be performed by an independent testing agency.
 - 5. Testing agency shall supply three (3) copies of test results to the Architect.

1.09 EXTRA MATERIALS

- A. Furnish extra materials from same production run as products installed.
- B. Contractor shall furnish a summary of the quantity of each color and size tile installed.
- C. Furnish an extra 3% of each tile type, size, and color in clean marked containers for Owner's use.

1.10 WARRANTY

- A. Provide manufacturer's standard commercial limited warranty.
 - 1. Limited Warranty Period: 20 years.
 - 2. Install product using the appropriate manufacturer's "Flooring Guaranteed Installation System".

- B. The Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 LUXURY SOLID VINYL TILE

- A. Manufacturer
 - 1. Armstrong Flooring, Inc., Natural Creations® with Diamond 10® Technology (ArborArt, Earth Cuts, Mystix) Luxury Vinyl Tile Flooring.
 - 2. Armstrong Flooring, Inc., Biome™ Luxury Flooring with Diamond 10 Technology™.
 - 3. Architect approved equivalent with a minimum 20 mil wear layer.
- B. Products.
 - 1. Description: A layered construction consisting of a tough, clear, vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
 - 2. Luxury Vinyl Tile shall conform to the requirements of ASTM F 1700, "Standard Specification for Solid Vinyl Tile", Class III, Type B - Embossed Surface.
- C. Color: As selected by the Architect from all available colors and patterns in the collection. Multiple colors may be used.
- D. Size: 4 inch x 36 inch, 4 inch x 48 inch, 6 inch x 36 inch , 8 inch x 36 inch , or 8 inch x 48 inch as selected by the Architect. Multiple widths/lengths may be used.

2.02 VAPOR REDUCTION MEMBRANE

- A. See Specification Section 090561.13.

2.03 ACCESSORY MATERIALS

- A. Adhesive: Luxury Vinyl Tile manufacturer's recommendation for each product, substrate, and location; must meet manufacturer's warranty requirements.
- B. Leveling and Underlayment Compound:
 - 1. Where required- verify with Architect prior to placement.
 - 2. Latex cementitious type as required by moisture vapor emission control manufacturer. Minimum 28-day compressive strength: 4000-lb./sq. ft.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Installer shall inspect subfloor surfaces to determine that they are satisfactory. A satisfactory subfloor surface is defined as one that is smooth and free from cracks, holes, and ridges. Coatings preventing adhesive bond, and other defects impair performance or appearance.
- B. Perform bond and moisture tests on concrete subfloors to determine if surfaces are sufficiently cured and dry as well to ascertain presence of curing compounds. Slab tolerance to be 1/16-inch per 1'-0" max. Coordinate with concrete slab contractor. (Manufacturer recommendation will supersede this requirement).

- C. Do not allow luxury vinyl tile flooring work to proceed until subfloor surfaces are satisfactory.

3.02 PREPARATION

- A. Test substrate to ensure proper dryness.
- B. Prepare subfloor surfaces as follows:
 - 1. Use leveling, and patching compounds as recommended by moisture vapor emission control manufacturer for filling small cracks, holes, and depressions in subfloors. Maximum surface variation: 1/8-inch in 10-feet in any direction.
 - 2. Remove coatings from subfloor surfaces that would prevent adhesive bond, including curing compounds incompatible with resilient flooring adhesives, paint, oils, waxes and sealers.
- C. Vacuum surfaces to be covered and inspect floor.
- D. Apply moisture vapor reduction membrane, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.03 INSTALLATION

- A. Comply with manufacturer's product data, including technical bulletins, product catalog, written installation instructions, and product carton instructions for installation and maintenance procedures..
- B. Lay tile and related materials so that fields or patterns center on areas, so that tile at opposite edges of room are of equal width.
 - 1. Adjust pattern that edge pieces are not less than 1/2 tile size.
 - 2. Lay tile square to room axis, unless otherwise shown.
 - 3. Verify moisture membrane has been laid perpendicular to the luxury vinyl tile direction.
 - 4. Stagger adjacent tiles per manufacturer's recommendation or as directed by the Architect.
- C. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged, if so numbered.
- D. Lay materials true to line, level, and with tight joints. Scribe, cut, and tightly fit materials to and around permanent fixtures, equipment, pipes, and bases. Extend luxury vinyl tile into toe spaces, door reveals, and into closets and similar openings.
 - 1. Lay tile with grain running in same directions.
- E. Tightly cement luxury vinyl tile to subbase (using full spread of adhesive applied in compliance with flooring manufacturer's directions) without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll luxury vinyl tile flooring at perimeter of each covered area to assure adhesion.
- F. Roll with a 100-pound roller in the field areas. Hand roll luxury vinyl tile flooring at perimeter of each covered area to assure adhesion. Refer to specific rolling instructions of the flooring manufacturer.
- G. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.
- H. After installation, remove excessive adhesive pursuant to luxury vinyl tile manufacturer's published instructions.

3.04 INSTALLATION OF ACCESSORIES

- A. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed and extends beyond.
- B. Do not install LVT after wall tile installation.
- C. Rubber Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.05 CLEANING AND PROTECTION

- A. Sweep and vacuum tile surfaces thoroughly.
- B. Scrub the floor with a neutral detergent solution to remove black marks and excessive soil. Thoroughly rinse and allow to air dry. DO NOT wash floor until time period recommended by luxury vinyl tile and moisture vapor emission control manufacturers has elapsed to allow luxury vinyl tile flooring to become well sealed in adhesive.
- C. Remove any excess adhesive or other surface blemishes, using appropriate cleaner recommended by luxury vinyl tile manufacturer.
- D. Protect flooring against damage during construction period to comply with luxury vinyl tile flooring manufacturer's directions.
- E. Protect flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishing across floors.
- F. Cover flooring with un-dyed, untreated building paper until inspection for Substantial Completion.

END OF SECTION

SECTION 097260 - TACKABLE WALLCOVERING **H2M**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Project Manual apply to work of this Section.

1.02 SUMMARY

- A. This section includes Resilient cork/linoleum tackable wallcovering and related accessories.
- B. Related Sections include the following:
 - 1. Section 092116 – Gypsum Board Assemblies
 - 2. Section 099100 – Painting

1.03 REFERENCES

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 – Submittal Procedures.
- B. Pursuant to Section 016000 – Product Requirements.
- C. Product Data: Catalog sheets and specifications indicating compliance with specified requirements for the following:
 - 1. Tac-Wall®.
 - 2. Adhesive, Primer/Sealer, Caulk.
 - 3. Metal Molding and other accessories.
- D. Color Selection: Submit samples of manufacturer's standard colors.
- E. Samples:
 - 1. Three (3) Tac-Wall® 7 x 9-inch samples of each type and color of tackable wallcovering material selected.
 - 2. Metal Molding: Two (2), 12-inch-long pieces.
- F. Insulation Instructions:
 - 1. Submit manufacturer's written installation instructions.
- G. Contract Closeout Submittals:
 - 1. Maintenance Data: Deliver two (2) copies covering the installed products, to the Architect.
 - a. Include manufacturer's recommended cleaning materials, application methods, and precautions in the use of materials and methods which would damage the wall covering.

1.05 QUALITY ASSURANCE

- A. Installer's Qualifications: The persons installing the wall covering and their Supervisor shall be experienced in wall covering installation and regularly employed by a company engaged in the installation of wall coverings for a minimum of five (5) years.
 - 1. Furnish to the Architect the names and addresses of five (5) similar projects which the foregoing people have worked on during the past three (3) years.

SECTION 097260 - TACKABLE WALLCOVERING^{H2M}

- B. Surface Burning Characteristics Classification: Provide materials that meet classification ratings below:
 - 1. ASTM E84 - (Flame Spread and Smoke Developed): II/B.
- C. Single Source Responsibility: Obtain tackable wallcovering system components from a single approved source.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in the manufacturer's original, unopened packages or containers, clearly labeled to identify manufacturer, brand name, quality or grade, and flammability and smoke developed classifications and numbers.
- B. Store wall covering materials in original, undamaged packaging inside a well-ventilated area protected from weather, moisture, soiling, and extreme temperatures. Maintain room temperature within the storage area at not less than 68 degrees F.
- C. Do not store wall covering in an upright position (on end).

1.07 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with manufacturer's written recommendations as to environmental conditions under which wall coverings can be applied.

1.08 WARRANTY

- A. Submit manufacturer's limited ten (10) year written warranty.
 - 1. Tackable wallcovering shall be warranted not to crack, chip, or peel, to resist staining and yellowing, and to show no appreciable fade when thoroughly cleaned and maintained.

PART 2 PRODUCTS

2.01 TACKABLE WALLCOVERING

- A. Manufacturer:
 - 1. Koroseal Interior Products, 3875 Embassy Parkway, Suite 110, Fairlawn, OH 44333. Phone: (855) 753-5474.
 - 2. Architect approved equivalent.
- B. Product:
 - 1. Walltalkers® Tac-Wall®
 - a. Uni-color, resilient, homogeneous, tackable linoleum surface consisting of linseed oil, granulated cork, rosin binders, and dry pigments calendered onto natural burlap backing. Color shall extend through thickness of material.
 - b. Size: 48-inch-wide rolls.
 - c. Gauge: 1/4 inch.
 - 2. Adhesive
 - a. Solvent free, SBR type linoleum adhesive as recommended by wallcovering manufacturer.
 - 3. Caulk
 - a. Color-matched caulk from wallcovering manufacturer.
 - 4. Trim for Tac-Wall®
 - a. J-Trim: JT12-00: Clear Satin, anodized aluminum, ¼ inch trim.
 - b. Inside Corner Trim: Clear Satin, anodized aluminum.
 - c. Outside Corner Trim: Clear Satin, anodized aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive wall covering for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Protection: Prior to surface preparations and wall covering application remove switch plates, wall plates, surface-mounted fixtures, and all other comparable items.
- B. Surface Preparation:
 - 1. Perform preparation and cleaning procedures in accordance with wall covering manufacturer's instructions and as specified.
 - 2. Remove dirt, grease, old adhesive, loose paint, and plaster from wall. Fill cracks, crevices, and holes with spackling. Sand rough spots smooth and flush with adjacent surfaces.
 - 3. Gypsum Wallboard: Recess nails and screws. Repair irregular tape joints, sand and remove dust. Apply primer/sealer and allow to dry.
 - 4. Plaster: Do not apply primer/sealer until moisture content is less than 8 percent as determined with electronic moisture meter. Remove crystals due to efflorescence. Apply primer/sealer and allow to dry.
 - 5. Concrete and Concrete Unit Masonry: Coat surface with 1/8 to 1/4 inch thickness of gypsum or Portland cement plaster or special masonry filler (block filler) and trowel smooth.
 - 6. Painted Surfaces: Remove loose paint. Dull surfaces of enamel and gloss paints, and rinse with clear water.

3.03 APPLICATION OF TACKABLE WALLCOVERING

- A. Handle and apply wall covering in accordance with manufacturer's instructions.
- B. Permanent HVAC should be set to 68 degrees Fahrenheit for at least 72 hours prior to, during, and after installation.
- C. Install with permanent lighting on.
- D. Place wall covering panels consecutively in the order they are cut from rolls, including spaces above or below openings.
- E. Apply adhesive with a 1/16-inch square notch trowel to the area to receive the sheet (apply enough for one sheet at a time).
- F. Install seams vertically and plumb, and at least six inches away from any corner unless noted otherwise.
- G. Replace items removed prior to commencing work, as noted in PREPARATION article above, to their original locations and orientations.

3.04 INSTALLATION OF METAL MOLDING

- A. Install with molding adhesive and fasteners in accordance with the molding manufacturer's recommendations and instructions.
- B. Miter corner bead molding at head/jamb intersections.

SECTION 097260 - TACKABLE WALLCOVERING **H2M**

3.05 ADJUSTING AND CLEANING

- A. Clean tackable wallcovering in accordance with manufacturer's written instructions.
- B. Upon completion of the Work, remove surplus materials, rubbish and debris resulting from installation of wall covering.

END OF SECTION

PART 1 - GENERAL

1.01 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. SUMMARY
 - 1. Section includes surface preparation and the application of paint systems on interior substrates.
 - a. Concrete.
 - b. Concrete Masonry Units.
 - c. Steel.
 - d. Galvanized metal.
 - e. Gypsum board.
 - f. Wood.
 - g. Aluminum.
 - h. Stucco
 - i. Clay Masonry
- C. DEFINITIONS
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
 - 6. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
 - 7. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.
- D. ACTION SUBMITTALS
 - 1. Product Data: For each type of product. Include preparation requirements and application instructions.
 - a. Samples for Initial Selection: For each type of topcoat product.
 - 1) Product List: For each product indicated, include the following:
 - (a) Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - (b) Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
 - (c) VOC content.
- E. CLOSEOUT SUBMITTALS
 - 1. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.
- F. MAINTENANCE MATERIAL SUBMITTALS

1. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

G. QUALITY ASSURANCE

1. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - a. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - 1) Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - (a) Other Items: Architect will designate items or areas required.
 - 2) Final approval of color selections will be based on mockups.
 - (a) If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3) Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - (a) Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. DELIVERY, STORAGE, AND HANDLING

1. 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 (7 deg C).
 - a. Maintain containers in clean condition, free of foreign materials and residue.
 - 1) Remove rags and waste from storage areas daily.
2. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:
 - a. Product name and type (description).
 - 1) Batch date.
 - 2) Color number.
 - 3) VOC content.
 - 4) Environmental handling requirements.
 - 5) Surface preparation requirements.
 - 6) Application instructions.

I. FIELD CONDITIONS

1. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F .
 - a. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - b. Lead Paint: It is not expected that lead paint will be encountered in the Work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Sherwin-Williams Company.
 2. Benjamin Moore & Co.
 3. PPG Architectural Finishes, Inc.

2.02 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. 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.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, 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).

1. Flat Paints and Coatings:	50 g/L.
2. Non-Flat Paints and Coatings:	100 g/L.
3. Non-Flat High Gloss	150 g/L.
4. Dry-Fog Coatings:	150 g/L.
5. Primers, Sealers, and Undercoaters:	100 g/L.
6. Quick Dry Enamel	150 g/L.
7. Anti-corrosive and Antirust Paints Applied to Ferrous Metals:	250 g/L.
8. Zinc-Rich Industrial Maintenance Primers:	250 g/L.
9. Industrial Maintenance High Temperature	420 g/L.
10. Floor Coatings:	100 g/L.
11. Stains	250 g/L.
12. Varnish	275 g/L.
13. Waterproofing Sealer - Wood	275 g/L.
14. Waterproofing Sealer - Concrete	100 g/L.
- D. Colors: As selected by Architect from manufacturer's full range.
 - 1. 30 percent of surface area will be painted with deep tones.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
 - 1. Report in writing conditions that may affect application, appearance or performance of paint.
- B. Substrate Conditions:
 - 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Masonry (Clay and CMU): 12 percent.
 - c. Wood: 15 percent.
 - d. Gypsum Board: 12 percent.
 - 2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection, if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - 1. Concrete Floors: Remove oil, dust, grease, dirt and other foreign materials. Comply with SSPC-SP 13/NACE 6 or ICRI 03732.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
 - 1. SSPC-SP 3, "Power Tool Cleaning."
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections and abraded areas of shop paint and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.
- H. Galvanized Metal Surfaces: 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.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view and dust off.
 - 3. Prime edges, ends, faces, undersides and backsides of wood.

4. after priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt and other foreign material that might impair the bond of paints to substrates.

3.03 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Unless otherwise specified or noted, paint all "unfinished" conduits, piping, hangers, ductwork and other mechanical and electrical equipment with color and texture to match adjacent surfaces, in the following areas:
 - a. where exposed-to-view in all exterior and interior areas.
 - b. in all interior high humidity interior areas.
 - c. in all boiler room, mechanical and electrical rooms.
 2. In unfinished areas leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
 3. Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
 4. Do not paint over nameplates.
 5. Paint the inside of all ductwork where visible behind louvers, grilles and diffusers for a minimum of 18" or beyond sight line, whichever is greater, with primer and one coat of matt black (non-reflecting) paint.
 6. Paint the inside of light valances gloss white.
 7. Paint disconnect switches for fire alarm system and exit light systems in red enamel.
 8. Paint red or band all fire protection piping and sprinkler lines in accordance with mechanical specification requirements and the AHJ. Keep sprinkler heads free of paint.
 9. Paint yellow or band all natural gas piping in accordance with mechanical specification requirements and the AHJ.
 10. Backprime and paint face and edges of plywood service panels for telephone and electrical equipment before installation to match adjacent wall surface. Leave equipment

in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

- a. Uninsulated plastic piping.
 - b. Pipe hangers and supports.
 - c. Metal conduit.
 - d. Plastic conduit.
 - e. Tanks that do not have factory-applied final finishes.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material. Coordinate the installation of required piping labels with the installing contractor in order to schedule painting prior to application of labels.
11. Paint the following work where exposed in occupied spaces:
- a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
12. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.04 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.05 PROTECTION

- A. Protect all exterior surfaces and areas, including landscaping, walks, drives, all adjacent building surfaces (including glass, aluminum surfaces, etc.) and equipment and any labels and signage from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.
- B. Protect all interior surfaces and areas, including glass, aluminum surfaces, etc. and equipment and any labels and signage from painting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.
- C. Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work area as required.

3.06 CLEANING

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

- 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. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.07 INTERIOR PAINTING SCHEDULE

- A. Concrete and Clay Masonry Substrates, Non-traffic Surfaces:
 - 1. Institutional Low-Odor/VOC Latex System: (MPI INT 3.1M).
 - a. Prime Coat:
 - 1) Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149. Sherwin-Williams - ProMar 200 Zero - Interior Latex Primer - B28W02600/B28WQ2600 (E3)
 - 2) Prime Coat: MPI # 3X-Green Sherwin-Williams PREPRITE® PROBLOCK® Interior/Exterior Latex Primer/Sealer B51-600 Series (E3)
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat (MPI INT 3.1L).
 - c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3), MPI #151 Sherwin-Williams Pre-Catalyzed Water Based Epoxy – Eggshell – K45-1150 Series (E3)
 - 2. Microbical Latex Finish System (Low VOC): With topcoat EPA registered No. 64695-1.
 - a. Prime Coat: Primer sealer, latex, interior
 - 1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils (0.203 mm) wet, 3.2 mils (0.081 mm) dry.
 - b. First Coat: Microbical Latex, interior, matching topcoat.
 - c. Topcoat: Microbical Latex, interior, eggshell:
 - 1) S-W Paint Shield Interior Latex Eg-Shel Microbical Paint, D12W51, at 4.0 mils (0.102 mm) wet, 1.8 mils (0.046 mm) dry, per coat. Brush and roll application only.
 - 2) S-W SuperPaint with Sanitizing Technology, Eg-Shel, A87W0001, at 4.0 mils wet, 1.7 mils, per coat. Brush and roll application only.
 - 3) S-W SuperPaint with Air Purifying Technology, Satin, A87W00061, at 4.0 mils wet, 1.7 mils, per coat. Brush and roll application only.
- B. Concrete Substrates, Traffic Surfaces:
 - 1. Latex Floor Enamel System: (MPI INT 3.2A)
 - a. Prime Coat: Floor paint, latex, slip-resistant, matching topcoat.
 - b. Topcoat: Floor paint, latex slip-resistant, low gloss (maximum Gloss Level 3), MPI #60: Sherwin-Williams - ArmorSeal Tread-Plex, B90 Series at 1.5 to 2.0 mils dry per coat.
 - 2. Clear Acrylic System, Gloss Finish: (MPI INT 3.2F)
 - a. First Coat: MPI #99 - Sherwin-Williams - H&C Concrete Sealer Wet Look Water Base, at 100 to 200 sq. ft. per gal (2.4 to 4.9 sq. m per l).
 - b. Second Coat: MPI #99 - Sherwin-Williams - H&C Concrete Sealer Wet Look Water Base, at 100 to 200 sq. ft. per gal (2.4 to 4.9 sq. m per l).
 - 3. Concrete Stain System (Water-based): (MPI INT 3.2E)
 - a. First Coat: Sherwin-Williams - H&C Concrete Stain Solid Color Water Based at 50 to 300 sq. ft. per gal.
 - b. Second coat: Sherwin-Williams - H&C Concrete Stain Solid Color Water Based at 50 to 300 sq. ft. per gal.

4. Concrete Substrates, Non-Slip - High Performance Traffic Surfaces: (MPI INT 3.2L)
 - a. Pigmented Polyurethane over Epoxy Slip-Resistant Deck Coating System:
 - 1) Prime Coat: Epoxy, gloss, (Gloss Level 6), MPI #212: S-W Armorseal 1000 HS, B67W2001 Series, at 2.5 to 4.0 mils dry, per coat.
 - 2) Intermediate: Polyurethane, gloss matching topcoat.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, (Gloss Level 6), MPI #211 S-W Armorseal HS Polyurethane, B65W220 Series, at 2.0 to 3.0 mils dry, per coat, with H&C SHARKGRIP Slip-Resistant Additive at the rate of one 3.2 ounce container per gallon.
- C. CMU Substrates
 1. Microbical Latex Finish System: With topcoat EPA registered No. 64695-1.
 - a. Block Filler: One or two coats as required:] Block filler, latex, interior/exterior:
 - 1) S-W Loxon Block Surfer, A24W200, at 10.0 mils (0.254 mm) wet, 8.0 mils (0.203 mm) dry, per coat.
 - b. First Coat: Microbical Latex, interior, matching topcoat.
 - c. Topcoat: Microbical Latex, interior, eggshell:
 - 1) S-W Paint Shield Interior Latex Eg-Shel Microbical Paint, D12W51, at 4.0 mils (0.102 mm) wet, 1.8 mils (0.046 mm) dry, per coat. Brush and roll application only.
 - 2) S-W SuperPaint with Sanitizing Technology, Eg-Shel, A87W0001, at 4.0 mils wet, 1.7 mils, per coat. Brush and roll application only.
 - 3) S-W SuperPaint with Air Purifying Technology, Satin, A87W00061, at 4.0 mils wet, 1.7 mils, per coat. Brush and roll application only.
 2. High-Performance Epoxy Paint System: (MPI INT 4.2E)
 - a. Block Filler: Block filler, epoxy, MPI #4 S-W Pro Industrial Heavy Duty Block Filler, B42W00150 at 16 to 21 mils dry, per coat.
 - b. Intermediate Coat: Epoxy, high-build, low gloss, MPI #108: S-W Macropoxy 646 Fast Cure Epoxy, B58 Series, at 5 to 10 mils dry, per coat.
 - c. Topcoat: Polyurethane, two-component, pigmented, gloss Gloss Level 5, MPI #174: Sherwin Williams Hi-Solids Polyurethane 250 Aliphatic Polyurethane, B65J-350 Series, at 3.0 to 5.0 mils dry, per coat.
 3. Water-Based Light Industrial Coating System: (MPI INT 4.2K)
 - a. Block Filler: Block filler, latex, interior/ exterior, MPI #4 X-Green: S-W Preprite Block Filler, B25W25 at 100 to 200 s.f. per gal.
 - b. Intermediate Coat: Light industrial coating, interior, water-based, matching Topcoat.
 - c. Topcoat:
 - 1) Topcoat: Light Industrial coating, interior, water-based, eggshell, (Gloss Level 3), MPI #151: S-W Pro-Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series at 1.5 mils per coat dry.
 - 2) Topcoat: Light Industrial coating, interior, water-based, eggshell, (Gloss Level 5), MPI #153: S-W Pro-Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series at 1.5 mils per coat dry.
 4. Latex System: (MPI INT 4.2A)
 - a. Block Filler: Latex Block Filler, MPI #4 X-Green: Sherwin-Williams - Prep-Rite Block Filler, B 25W25, at 100 to 200 sq. ft.. per gal.
 - b. Intermediate coat: Latex interior, matching topcoat.
 - c. Topcoat:
 - 1) Topcoat: Latex, interior flat (Gloss Level 1), MPI #53 X-Green / #143 X-Green): S-W Pro Mar 200 Zero VOC Latex Flat, B30-2600 Series applied to achieve 1.6 mils dry per coat.
 - 2) Topcoat: Latex, interior flat (Gloss Level 2), MPI #44 X-Green / #144 X-Green): S-W Pro Mar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series applied to achieve 1.6 mils dry per coat.

- 3) Topcoat: Latex, interior eggshell (Gloss Level 3), MPI #52 X-Green / #145 X-Green): S-W Pro Mar 200 Zero VOC Latex Eg-Shel, B20-2600 Series applied to achieve 1.7 mils dry per coat.
- 4) Topcoat: Latex, interior semi-gloss (Gloss Level 4), MPI #43 X-Green: S-W Pro Mar 200 Zero VOC Latex Eg-Shel, B31-2600 Series applied to achieve 1.6 mils dry per coat.
- 5) Topcoat: Latex, interior gloss (Gloss Level 5, MPI #54: S-W Pro Mar 200 Zero VOC Latex Gloss, B11-2200 Series applied to achieve 1.5 mils dry per coat.

D. Metal Substrates:

1. Latex System: (MPI INT 5.1Q)
 - a. Prime Coat: Primer, rust-inhibitive, water-based, MPI #107: S-W Pro-Industrial Pro-Cryl Universal Primer, B66-310 Series at 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Water-based acrylic interior, matching Topcoat.
 - c. Topcoat:
 - 1) Topcoat: Pro Industrial™ Waterbased Alkyd Urethane Enamel, Semi-Gloss, B53W02151 to achieve 1.6 mils dry per coat.
 - 2) Topcoat: Pro Industrial™ Waterbased Alkyd Urethane Enamel, Gloss, B53W01051 to achieve 1.6 mils dry per coat.
2. Water-Based Dry-Fall System: (MPI INT 5.1C)
 - a. Two Top Coats: Dry-fall latex, flat, MPI #118: S-W Pro Industrial Waterborne Acrylic Dryfall Flat, B42-80 Series, at 6.0 mils wet, 1.7 mils dry per coat.
 - b. Topcoat:
 - 1) Two Top Coats: Dry-fall latex, eggshell, MPI #131/155: S-W Pro Industrial Waterborne Acrylic DryFall Eg-Shel, B42-2 Series, at 6.0 mils wet, 1.9 mils dry per coat.
 - 2) Two Top Coats: Dry-fall latex, semi-gloss, MPI #226: S-W Pro Industrial Waterborne Acrylic DryFall Semi-Gloss, B42-80 Series, at 5.8 mils wet, 2.3 mils dry per coat.
3. Pigmented Polyurethane over Epoxy System:
 - a. Prime Coat: Epoxy, high-build, low gloss, MPI #108: S-W Macropoxy 646 Fast Cure Epoxy, B58 Series, at 5 to 10 mils dry, per coat.
 - b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
 - c. Topcoat: Polyurethane, two-component, pigmented, semi-gloss, (Gloss Level 5), MPI #174: S-W Hi-Solids Polyurethane 250 Aliphatic Polyurethane, B65J-350 Series, at 3.0 to 5.0 mils dry, per coat.
4. Epoxy-Modified Latex System: (MPI INT 5.1K)
 - a. Prime Coat: Primer, rust-inhibitive, water based, MPI #107: S-W Pro-Cryl Universal Primer, B66-310 Series, at 2.0 to 4.0 mils dry, per coat.
 - b. Intermediate Coat: Epoxy-modified latex, interior, gloss matching topcoat.
 - c. Topcoat:
 - 1) Topcoat: Epoxy-modified latex, interior, eggshell, (Gloss Level 3), MPI #254/MPI #254X-Green: S-W Pro Industrial Water based Catalyzed Epoxy Eggshell, B73-300 Series, at 2.0 to 4.0 mils dry, per coat.
 - 2) Topcoat: Epoxy-modified latex, interior, gloss, (Gloss Level 6), MPI #115/MPI #115X-Green: S-W Pro Industrial Water based Catalyzed Epoxy Gloss, B73-300 Series, at 2.0 to 4.0 mils dry, per coat.
5. Acrylic/Alkyd System:
 - a. Prime Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
 - c. Topcoat:
 - 1) Topcoat: Pro Industrial™ Waterbased Alkyd Urethane Enamel, Semi-Gloss, B53W02151 to achieve 1.6 mils dry per coat.

- 2) Topcoat: Pro Industrial™ Waterbased Alkyd Urethane Enamel, Gloss, B53W01051 to achieve 1.6 mils dry per coat.
- E. Galvanized-Metal Substrates:
1. Pigmented Polyurethane System: (MPI INT 5.4C)
 - a. Prime Coat: Primer, vinyl wash: Sherwin-Williams - DTM Wash Primer, B71Y1, at 0.7 to 1.3 mils dry, per coat.
 - b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
 - c. Topcoat: Hi-Solids Polyurethane 250 Aliphatic Polyurethane, B65J-350 Series, at 3.0 to 5.0 mils dry, per coat
- F. Aluminum (Not Anodized or Otherwise Coated) Substrates:
1. Pigmented Polyurethane System:
 - a. Prime Coat: Primer, vinyl wash: Sherwin-Williams - DTM Wash Primer, B71Y1, at 0.7 to 1.3 mils dry, per coat.
 - b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
 - c. Topcoat: Hi-Solids Polyurethane 250 Aliphatic Polyurethane, B65J-350 Series, at 3.0 to 5.0 mils dry, per coat.
- G. Wood Substrates:
1. Microbicial Latex Finish System: With topcoat EPA registered No. 64695-1.
 - a. Prime Coat: Primer, latex, interior, anti-microbial:
 - 1) S-W PrepRite ProBlock Interior/Exterior Latex Primer/Sealer, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry.
 - b. First Coat: Microbicial Latex, interior, matching topcoat.
 - c. Topcoat: Microbicial Latex, interior, eggshell:
 - 1) S-W SuperPaint with Sanitizing Technology, Eg-Shel, A87W0001, at 4.0 mils wet, 1.7 mils, per coat. Brush and roll application only.
 - 2) S-W SuperPaint with Air Purifying Technology, Satin, A87W00061, at 4.0 mils wet, 1.7 mils, per coat. Brush and roll application only.
 2. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #39: S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry (E3)
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat:
 - 1) Topcoat: Pro Industrial™ Waterbased Alkyd Urethane Enamel, Semi-Gloss, B53W02151 to achieve 1.6 mils dry per coat.
 - 2) Topcoat: Pro Industrial™ Waterbased Alkyd Urethane Enamel, Gloss, B53W01051 to achieve 1.6 mils dry per coat.
 3. Stain & Varnish
 - a. Stain: MPI #90: Sherwin Williams - Wood Classics 250 - A49-800 Series (E3)
 - b. Intermediate Coat: Sherwin Williams - Classics Waterborne Polyurethane Varnish - Satin - 4.0 mils wet, 1.0 mils dry.
 - c. Topcoat: Sherwin Williams - Classics Waterborne Polyurethane Varnish - Satin - 4.0 mils wet, 1.0 mils dry.
- H. Gypsum Board Substrates:
1. Microbicial Latex Finish System: With topcoat EPA registered No. 64695-1.
 - a. Prime Coat: Primer, latex, interior:
 - 1) S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils (0.102 mm) wet, 1.0 mils (0.025 mm) dry.
 - b. First Coat: Microbicial Latex, interior, matching topcoat.
 - c. Topcoat: Microbicial Latex, interior, eggshell:
 - 1) S-W SuperPaint with Sanitizing Technology, Eg-Shel, A87W0001, at 4.0 mils wet, 1.7 mils, per coat. Brush and roll application only.

- 2) S-W SuperPaint with Air Purifying Technology, Satin, A87W00061, at 4.0 mils wet, 1.7 mils, per coat. Brush and roll application only.
- 3) S-W Scuff Tuff, Eg-Shel, S24-50 Series, at 4.0 mils wet, 1.2 mils dry.
2. Latex System: (INT 9.2A)
 - a. Prime Coat: Primer, latex, interior, MPI #149 X-Green: S-W Pro Mar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat:
 - 1) Topcoat: Latex, interior, flat (Gloss Level 1), MPI #53 X-Green/#143 X-Green: S-W Pro Mar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - 2) Topcoat: Latex, interior, low sheen, (Gloss Level 2), MPI #44 X-Green/#144 X-Green: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - 3) Topcoat: Latex, interior, eggshell, (Gloss Level 3), MPI #52 X-Green/#145 X-Green: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
 - 4) Topcoat: Latex, interior, semi-gloss, (Gloss Level 4), MPI #43 X-Green: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - 5) Topcoat: Latex, interior, gloss, (Gloss Level 5), MPI #54: S-W ProMar 200 Latex Gloss, B11-2200 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
3. Institutional Low-Odor/VOC Latex System: (MPI INT 9.2M)
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149. Sherwin-Williams - ProMar 200 Zero - Interior Latex Primer B28W02600/B28WQ2600 (E3)
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat:
 - 1) Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1), MPI #143: Sherwin-Williams SuperPaint Air Purifying, Interior Acrylic Flat, A86W00061 (E3) , at 4.0 mils wet, 1.6 mils dry, per coat.
4. High-Performance Architectural Latex System: (INT 9.2B)
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.Sherwin-Williams - ProMar 200 Zero - Interior Latex Primer B28W02600/B28WQ2600 (E3)
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3), MPI #139: Sherwin-Williams ProMar 200 HP Zero VOC, Interior Acrylic Eg-Shel, B20W01951 (E3) , at 4.0 mils wet, 1.6 mils dry, per coat.
5. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50 X-Green: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat:
 - 1) Topcoat: Light industrial coating, interior, water based, eggshell, (Gloss Level 3), MPI #151: S-W Pro Industrial Pre-Catalyzed Water based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
 - 2) Topcoat: Light industrial coating, interior, water based, semi-gloss, (Gloss Level 5), MPI #153: S-W Pro Industrial Pre-Catalyzed Water based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
6. Epoxy-Modified Latex System: (MPI INT 9.2F)
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50: S-W Pro Mar 200 Zero VOC Interior Latex Primer, B28 Series, at 1.0 mils dry, per coat.
 - b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
 - c. Topcoat:

- 1) Topcoat: Epoxy-modified latex, interior, eggshell, (Gloss Level 3), MPI
#115/#115X-Green: S-W Pro Industrial Water based Catalyzed Epoxy Eggshell,
B73-360 Series, at 2.0 to 4.0 mils dry, per coat.
- 2) Topcoat: Epoxy-modified latex, interior, gloss, (Gloss Level 6), MPI
#115/#115X-Green: S-W Pro Industrial Water based Catalyzed Epoxy Gloss,
B73-300 Series, at 2.0 to 4.0 mils dry, per coat

END OF SECTION

PART 1-GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following types of signs;
 - 1. ADA Compliant Interior Room/Door Signage & Specialty Signage.
 - 2. Cast Metal Dedication Plaque.
 - 3. Exterior Wall Mounted Letters and Numbers.
 - 4. Exterior Wall Mounted Back Lighted Letters.
 - 5. Exterior Maltese Cross and/or Medallion.
 - 6. Exterior High-Density Urethane (HDU) Sign
 - 7. Interior Evacuation Route Signs
 - 8. Decal Signage
 - 9. Truss Identification Signage.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary project identification signs.
 - 2. Section 061000 - Rough Carpentry.
 - 3. Section 101443 - Photoluminescent Path Markings.
 - 4. Division 22 for "Plumbing Identification" for labels, tags, and nameplates for plumbing equipment.
 - 5. Division 23 for "Mechanical Identification" for labels, tags, and nameplates for mechanical equipment.
 - 6. Division 26 for "Electrical Identification" for labels, tags, and nameplates for electrical equipment.
 - 7. Division 26 for "Interior lighting" for illuminated exit signs.
 - 8. Civil Drawings for exterior traffic control and parking space signage.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. 36 CFR 1191 - American with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.
- C. ADA Standards - American with Disabilities Act (ADA) Standards for Accessible Design.
- D. ICC A117.1 - Accessible and Usable Buildings and Facilities.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures.
- B. Pursuant to Section 016000 - Product Requirements.
- C. LEED Submittals:
 - 1. Credit MR 4.1 and MR 4.2: Provide documentation indicating how the requirements of Credit MR 4.1 and MR 4.2 will be met.

- a. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product have recycled content.
 - b. Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content
2. Credit EQ 4.1: Provide manufacturers product data for installation adhesives, including printed statement of VOC content.
3. Credit MR 5.1: Provide product data indicating location of material manufacturer for regionally manufactured materials.
 - a. Include statement indicating cost and distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating cost and distance from point of extraction, harvest, or recovery to Project for each raw material used in regionally manufactured materials.
- D. Submit samples of each color and finish of exposed materials and accessories required for specialty signs. Submit full range of available fonts for all signage. Architect's review of samples will be for color, texture and fonts only.
- E. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
 1. Provide message list for each sign, including large-scale details of wording, lettering, symbols and Braille layout.
 2. Any sign, plaque and or medallion containing artwork, it is the responsibility of the manufacturer to re-create artwork (vector graphics will not be provided).

1.05 QUALITY ASSURANCE

- A. Experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards shall perform all work of this section.
- B. Source Limitations: Obtain each sign type through one source from a single manufacturer.
- C. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.08 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs and/or letters.
 1. For signs and letters supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

PART 2 PRODUCTS

2.01 INTERIOR ROOM SIGNAGE

- A. Interior Room Signs: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
1. Interior Room Signs and Specialty Signs
 - a. Intelligent Signage, Inc., 2 Hickory St., Holyoke, MA 01040. Phone: 413-409-8195.
 - b. Mohawk Sign Systems, Series 2000-ARCH, P.O. Box 966, Schenectady, NY 12301-0966. Phone: (518) 842-5303.
 - c. Architect Approved Equivalent meeting LEED Credit MR 5.1 requirements.
 2. All signs shall be manufactured using Graphic Process Sand Carved using Format D.
 - a. Plastic or metal signs with tactile reflective routed lettering. Raised and Brailled Characters and Pictorial Symbol Signs (Pictograms) shall be raised the required 1/32-inch from sign face. Glue-on letters or etched backgrounds are not acceptable.
 - b. Grade 2 Braille shall accompany all text. Braille shall be separated 1/2-inch from the corresponding raised characters. Grade 2 Braille translations to be provided by signage manufacturer.
 - c. Architect shall select colors from manufacturer's full range.
 - d. Every door in the project shall have an identifying sign at every door or opening into the room/corridor.
 - e. All signage shall meet ADA and ANSI requirements.
 - f. Symbols of Accessibility: Facilities and elements required to be identified as accessible by Part 1341.0401 shall use the Modified International symbol of accessibility.
 3. Sign material shall be melamine plastic laminate, approximately 1/8-inch thick with contrasting core color. The melamine shall be non-static, fire-retardant and self-extinguishing. The plastic laminate shall be impervious to most acids, alkalis, alcohol, solvents, abrasives and boiling water.
 4. Size of letters and numbers shall be as follows:
 - a. Room Number shall be 1-inch high.
 - b. Lettering for Room ID signs shall be 3/4-inch high.
 - c. Symbol size shall be 5-inches high.
 - d. Standard Grade 2 Braille shall be 1/2-inch below copy.
 5. Letterform shall be Gill Sans upper case.
 6. Copy Position: CC (centered/centered)
 7. Sign Size:
 - a. Room Function Signs: 6 inches high x 8 inches wide unless text requires a longer sign.
 - b. Restroom Signs; shall be 9-inches x 9-inches with a 5-inch accessibility symbol, gender symbol, and the verbal description placed directly below followed by Grade 2 Braille.
 - c. Restroom Sign with Changing Station: shall be same as restroom sign only increase size to 12-inches x 12-inches to also include baby changing symbol and the verbal description placed directly below followed by Grade 2 Braille..
 - d. Corners: Square Edge.
 8. Stairwell Signage:
 - a. A Floor Level Sign meeting ADA sign requirements with tactile letters and braille installed inside the stairwell and located at each floor level landing next to the door leading from the stairwell into the corridor.
 - b. If there is an exit door from the stairwell leading to the exterior or to the level of discharge exit for the building, there should be an ADA compliant "EXIT" sign with raised characters and braille installed adjacent to the door. Doors leading to exit doors should be identified with "EXIT ROUTE".

- c. Corridor or hallway doors leading INTO stairwells require ADA compliant tactile and braille signs designating "STAIRS" or the stairwell ID (i.e. - STAIR A).

2.02 EXTERIOR LETTERS

- A. Available Manufacturers:
 - 1. Gemini Inc. 103 Mensing Way, Cannon Falls, MN 55009, Phone: (800) 538-8377
 - 2. Architect Approved Equivalent.
- B. Material: Cast Aluminum
 - 1. Specialty Finish as selected by the Architect from the following:
 - a. Clear Anodized
 - b. Champagne Anodized
 - c. Gold Anodized
 - d. Light Bronze Anodized
 - e. Medium Bronze Anodized
 - f. Dark Bronze Anodized
 - g. Black Anodized
- C. Size: As shown on Contract Drawings.
 - 1. Letter Height: As shown on Contract Drawings.
 - 2. Letter Depth: As recommended by manufacturer based on letter height (3/4" to 1-1/2").
- D. Lettering Style: to be selected by Architect
- E. Mounting: Exterior
 - 1. Verify location with Architect and Owner.
 - 2. Method: Mount to wall.
 - a. Use projected spacer style mounting.
- F. Names: Letters to spell out "Name of Fire Department" in all uppercase letters and building numbering as shown on the Contract Drawings.

2.03 DEDICATION PLAQUE

- A. Available Manufacturers:
 - 1. United States Bronze, 811 Second Avenue, New Hyde Park, NY 11040 Phone: (800) 872-5155
 - 2. Matthews International Corporation, 2 North Shore, Pittsburgh, PA 15212. Phone: (800) 950-1317.
 - 3. Architect Approved Equivalent.
- B. Plaque: Castings shall be free from pits, scale, sand holes, or other defects. Comply with requirements specified for metal, border style, background texture, and finish and with other requirements shown for thickness, size, shape, and copy. Hand-tool and buff corners and raised copy to produce the manufacturer's standard satin polished finish. Refer to the "Materials" Article for other finish requirements.
- C. Material: Cast Bronze
 - 1. Lettering, border, texture and background color selected by Architect from manufacturer's full range.
- D. Border:
 - 1. Single Line
 - 2. Double Line

- 3. Single Line Bevel Edge
- E. Finishes:
 - 1. Background Texture: Leatherette, Pebble, Travertine or Sculptured as selected by the Architect.
 - 2. Surface Finish: Satin Bronze, Polished Finish or Random-Orbital as selected by the Architect.
- F. Size: Minimum 864 Sq. In.
- G. Lettering: Raised, Gill Sans upper case, Size as determined by plaque layout.
- H. Mounting:
 - 1. Verify location with Owner and Architect.
 - 2. Method: Drilled thru to receive screws with rosettes
- I. Names:
 - 1. Village & Fire Company Names
 - 2. Village & Fire Department Emblems
 - 3. H2M architects + engineers
 - 4. Other individuals and wording to be selected by Owner.
 - 5. Construction Contractors
- J. Bronze Castings: Provide bronze castings, copper alloy UNS C83600, complying with the requirements of ASTM B 584.
- K. Protective Coating: Semi-Gloss Clear Protective Lacquer for Interior or Exterior Applications.

2.04 EXTERIOR MEDALLION

- A. Material: Cast Aluminum - 1 3/4" thick at returns
 - 1. Hand Painted on full color flat relief
- B. Size: 66 inch diameter
- C. Lettering Style: to be selected by Architect
 - 1. Artwork to be supplied by Owner
- D. Mounting: Exterior
 - 1. Verify location with Architect and Owner
 - 2. Method: Mount to ACMU wall
 - a. Use projected spacer style mounting

2.05 TRUSS IDENTIFICATION SIGNAGE

- A. Signs identifying the existence of truss construction shall consist of a circle 6" in diameter, with a stroke width of 1/2 inch. The sign background shall be reflective white in color. The circle and contents shall be reflective red in color, conforming to Pantone matching system (PMS) #187. Signs directly applied to a door or sidelight may be a permanent non-fading sticker or decal. Signs not directly applied to doors or sidelights shall be of sturdy, non-fading, weather resistant material.
- B. Quantity: Two decal type, One aluminum.
- C. Copy: To be furnished

2.06 SPECIALTY SIGNS

A. Special Signs

1. Provide the following special signs constructed in the same manner as room identification signage unless noted otherwise, in colors as selected by the Architect. Consult Architect for exact placement location of these signs.
 - a. Two - 12 inch x 12 inch, "In Case of Fire-Use Stairs" with graphics to be located near elevator doors on each floor.
 - b. One gate sign (16 inch x 16 inch). Provide means for attaching to gate mesh fabric or pickets.
 - 1) Copy: "Training Only--Gate must remain closed and locked at all times when not in use".
 - c. Six rappelling point load signs (4"x12")
 - 1) Copy to be furnished.
 - d. One - 8 inch x 11 inch, typical class K fire extinguisher sign.
 - e. Thirteen - 6 inch x 6 inch, "EXIT" (See Life Safety Drawing(s) for Locations).
 - f. 8 inch high x 10 inches wide, "Maximum Occupancy ##"
 - g. One white reflective aluminum exterior sign with red letters 12"x 12" "FDC" furnish with brass screws for exterior mounting.
 - 1) Sign to be composed of an inner polyethylene core sandwiched between two sheets of 0.008 aluminum.
 - 2) Engineer-grade reflective vinyl overlay.
 - 3) Visible both day and night.
 - h. Four 12 inch x 12 inch, "No Storage Allowed".
 - i. Two - 12 inch x 12 inch, "In Case of Fire-Use Stairs" with graphics to be located near elevator doors on each floor.
 - j. Four 12 inch x 12 inch, "Training Only" furnish with brass screws for exterior mounting.
 - k. Two door signs (6" high x 24" wide) at Doors _____ and _____-"Training Only-Door Must Remain Closed and Locked at All Times When Not In Use".
 - l. ____ - 16 inch x 16 inch, Text and location to be determined by the Architect
 - m. One - 8 inch x 20 inch, "Emergency Exit Only Alarm Will Sound"
 - n. Four - 10 inch x 10 inch, "Authorized Personnel Only".
 - o. Four - 6 inch x 12 inch, "Smoke Free Premises".
 - p. One - 12 inch x 12 inch sign "Authorized Personnel Only - Not An Exit"
 - q. Four - 10" x 14" sign "Four-Fold Door Open Storage Zone - Keep Clear"
 - r. Floor Level Signs -- In multi-story buildings at stairways provide floor level designation signage.
 - s. Area of Refuge--if building has designated areas of refuge appropriate signage is required--check code.

B. Interior Evacuation Plan Signage

1. Provide four (4) 18" x 24" building floor plan signs each in a 1-1/2" wood frame stained to match wood door finish suitable for wall hanging.
 - a. Required plan and information to be printed on high quality, heavy stock paper and covered with museum grade glass in the specified wood frame.
 - b. Each sign shall show the building floor plan (partial or full) showing in red, primary path of travel (solid red line) and secondary path of travel (dashed red line) to nearest exit(s) from specific room location.
 - c. All text shall be bold and minimum of 3/4" in height.
 - d. Sign shall be titled "EVACUATION PLAN", Room #, Room Name.
 - e. Show with circular yellow and black person graphic or other distinctive emblem "You are here".
 - f. Show Fire Alarm Pull Box Locations, Stairways (if applicable), Exits.

- g. Identify fire alarm system's sounds and appearance.
- h. Include: "Emergency Phone Number: 911".
- i. If signage is located on an upper or basement floor include: "Use Stairway for Exit -- Do Not Use Elevator".
- j. Floor plan graphics will be furnished by Architect.

2.07 EXTERIOR MALTESE CROSS

- A. Material: Cast Aluminum - 3/8 inch thick
 - 1. Colors: to be selected by Architect
- B. Size: 48 inch diameter
 - 1. Lettering Style: to be selected by Architect
 - 2. Mounting: Exterior
 - a. Verify location with Architect and Owner
 - b. Method: Mount to brick wall
 - 1) Use projected spacer style mounting

2.08 EXTERIOR WALL MOUNTED WELDED BACK-LIT LETTERS

- A. Material: Aluminum Reverse Channel Letters 3-1/2" deep.
 - 1. Faces: 0.090 aluminum.
 - 2. Returns: 0.063 aluminum, welded construction.
 - 3. Backs: 0.150 polycarbonate backs. Mounting and electrical holes to be CNC cut into the polycarbonate backs.
- B. Size: 16 inches high
- C. Lettering Style: As selected by the Architect.
- D. Illuminated Text Characters: Blackened aluminum die-cut alphanumeric characters mounted with stand-offs, with backlighting LED lighting including transformers, insulators, and other accessories for operability, with provisions for servicing and concealing connections to building electrical system.
 - 1. UL approved LEDs.
 - 2. Lead wires/cables (10') and power supplies to be included.
 - 3. Use tight or sealed joint construction to prevent unintentional light leakage.
 - 4. Space lamps apart from each other and away from character surfaces as to illuminate evenly.
 - 5. Power: As indicated on Electrical Drawings.
 - 6. Weeps: Provide weep holes to drain water at lowest point of exterior characters.
 - 7. Provide UL labels on bottom of each letter.
 - 8. Warranty:
 - a. LED's to include a five (5) year warranty.
 - b. Power supplies to include a two (2) year warranty.
- E. Text: As shown on Contract Drawings in all uppercase letters.
- F. Stand-Offs: provide stand-offs to place the letter 1.5" off the wall unless sign fabricator recommends a different stand-off for optimum effect.

2.09 EXTERIOR DOUBLE SIDED HDU SIGN

- A. Material: 3" thick High-Density Urethane (HDU)
 - 1. Color: to be selected by Architect

- B. Size and Shape: As shown on Contract Drawings
- C. Lettering Style: Times New Roman: V-Carved into HDU - Gold Leaf lettering painted with black outline.
 - 1. Gold Leaf: 22-Karat or 23 Karat, yellow gold leaves (metallic paint or imitation Gold Leaf is not acceptable).
 - 2. Seal Gold Leaf with recommended high gloss acrylic sealer suitable for exterior applications.
 - 3. Mounting: Exterior
 - a. Mount to masonry piers with continuous 1" x 1" brass angle (both sides). Secure angle to HDU sign with brass screws at 6" o.c. and to masonry piers with brass or stainless-steel expansion anchors.
 - 4. Text: See Contract Drawings.

2.10 DECAL(S)

- A. Manufacturer:
 - 1. CustomWindowClings, 614 Frelinghuysen Ave., Newark, NJ 07114, www.customwindowclings.com.
 - 2. Architect approved equivalent.
- B. Custom Window Decal
 - 1. Adhesive vinyl, laminated with a UV protective layer and contour cut to size.
 - 2. Inside window application.
 - 3. Diameter: 60" will required two-piece decal.
 - 4. Colored rendition located at end of this section.
 - 5. Owner will provide computer images of the decal design and color.

2.11 FASTENERS AND ANCHORS

- A. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
- B. Anchors and Inserts: Use nonferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Locate sign units and accessories where indicated, specified, or required by code, using mounting methods of the type described and in compliance with the manufacturer's instructions and conformance with ADA.
 - 1. Install signs level, plumb, and at height indicated, with sign surfaces free from distortion or other defects in appearance.
 - 2. Corrosion Protection: Coat Concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
 - 1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

2. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
 3. Exterior signs: Use brass screws with plastic shields or stainless steel expansion type anchors at all four corners.
- C. Cast Metal Plaques: Mount plaques using the standard method recommended by the manufacturer for the type of wall surface indicated.
1. Face Mounting: Mount plaques using exposed fasteners with rosettes attached through the face of the plaque into the wall surface.
- D. All signage and subsequent mounting shall comply with ANSI and ADA.
1. Tactile signage shall be located alongside the door on the latch side
 2. Tactile signage shall be mounted at 60" A.F.F. to the centerline of the sign.
 3. At locations of double doors, tactile signs shall be mounted to the right of the right-hand door.
 4. Where there is no available wall space at the latch side of the door, signs may be placed on the nearest adjacent wall.
- E. Verify all mounting locations with the Architect prior to any work.

3.02 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner and Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Touchscreen Meeting Room Screen System.

1.02 REFERENCE STANDARDS

- A. ANSI/Infocomm 10 - Audiovisual Systems Performance Verification; 2013.
- B. UL 879 - Electric Sign Components; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting two weeks prior to the start of the work of this section; require attendance by all affected installers.

1.04 SUBMITTALS

- A. See Section 35 - 35, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets on panelized LED display systems including recommendations for preparation, storage and handling, and installation.
- C. Shop Drawings: Indicate cable routing, connections between equipment, anchor and support details, and adjacent construction.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Project Record Documents: Provide quantities, type, and location for components, cabling and accessories.
- F. System Setting Backup: Provide an electronic file of all system settings.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Authorized Manufacturer Representative: System shall be configured and commissioned by an authorized manufacturer representative.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in compliance with manufacturer instructions.

1.07 WARRANTY

- A. See Section 52 - 52, for additional warranty requirements.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. VisioSign: Blackline-10POE-LUX-ENG, Product Number 303076 with touch.

2.02 PANELIZED LED VIDEO DISPLAY

- A. Performance Requirements:
1. Comply with performance standards based on tests conducted in accordance with ANSI/Infocomm 10.
 2. Provide products that are listed and labeled as complying with UL 879, where applicable.
- B. System Type: Flat.
1. Material: Black steel cabinet, shock-resistant aluminum frame, glass front.
 2. Pixel Pitch: 10.1", 1280 x 800, PCAP touch, 16:10
 3. Horizontal Viewing Angle: 170 degrees (plus/minus 85 degrees off center).
 4. Vertical Viewing Angle: 160 degrees (plus/minus 80 degrees off center).
 5. Brightness: 350 NIT, under typical conditions adjustable
 6. Mount Type: Custom Wall Mount. Integral to each unit. Mount shall conceal connection ports located on the back of each unit. Each screen shall have a hidden reset button.
 7. Mounting: Portrait or Landscape.
 8. Location: Indoor.
 9. Total Height: 6.65 in (169 mm).
 10. Total Width: 9.84 in (250 mm).
 11. Panel Depth: 1.30 inches (33 mm).
 12. Power consumption: 15 Watts max., Fanless, SSD
 13. Power: Power over Ethernet IEEE 802.3 af / a.
 14. Software: Windows 10.
 - a. Ability to interface and directly extract and view meeting information from booking-systems such as Outlook and Google Calendar.

2.03 CONTROLS

- A. Interface Unit:
1. Fully programmable Dual LED functionality for ambient lighting or room occupancy status indication.
 2. Touch-activated content can be combined with standardized information.
 3. Information can be fully integrated with the VisioSign Cloud. Content can be differentiated at each screen to integrate general and local specific.
 4. With the following abilities; scale media, rotate media, adjust brightness, loop output, and input selection.
 5. Input source supports DVI, HDMI, PC, VGA, and S-Video.
 6. Output to Cat6. Network cable can be connected from any of the four sides.
 7. Working Voltage: 120 VAC / 240 VAC at 60Hz.

END OF SECTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Surface Mounted, Sensor Operated Towel Dispenser.
 - 2. Surface Mounted Waste Receptacles.
 - 3. Semi-Recessed Paper Towel Dispenser/Receptacle.
 - 4. Vanity Mounted Soap Dispensers.
 - 5. Wall Mounted Soap Dispensers.
 - 6. Surface-Mounted Multi-Roll Toilet Tissue Dispensers.
 - 7. ADA Compliant Grab Bars.
 - 8. Surface Mounted Sanitary Napkin Disposals.
 - 9. Towel Bars.
 - 10. Robe Hooks.
 - 11. Shower Curtain Rods, Curtains and Hooks.
 - 12. Fold Down Shower Seat.
 - 13. Mop and Broom Holders.
 - 14. Tubular Steel Wall Racks (Coat Racks).
 - 15. Closet Rods.
 - 16. Apparatus Bay Broom Center Racks.
 - 17. Biohazard poly-waste container.
 - 18. Electric Hand Dryers.
 - 19. Diaper Changing Station.
 - 20. Raised Edge Shelf.
 - 21. Associated Fasteners and Batteries.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 042200 – Concrete Unit Masonry for attachment to this material.
 - 2. Section 061000 – Rough Carpentry for wood blocking and nailers.
 - 3. Section 088300 – Mirrors.
 - 4. Section 092116 – Gypsum Board Assemblies for attachment to and solid wood blocking for this material.
 - 5. Section 093013 – Ceramic Tiling for attachment to this material.
 - 6. Section 102113 – Toilet Partitions for attachment to this material.
 - 7. Section 102826 – Hygiene Accessories for hand sanitizers and door foot-pulls.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.

1.04 SUBMITTALS

- A. Pursuant to Section 013300 – Submittal Procedures.
- B. Pursuant to Section 016000 – Product Requirements
- C. Product Data: Provide manufacturer's cut sheets for each different type or style of toilet and miscellaneous accessories required for the project.

- D. Accessories schedule: Indicate manufacturer's name, product description, product model number, finish, mounting, special components, and location of each item.
- E. Maintenance: Provide manufacturer's written maintenance instructions and recommendations for each item where applicable.
- F. Warranties: Provide manufacturer's standard warranty for each item or groups of items. Specific duration warranties are specified in the technical section below. All warranties shall commence on the date of Substantial Completion of the Project.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturer's recommendations and/or industry standards.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Protect against moisture exposure and damage.
- C. Deliver to project site in manufacturer's original packaging with intended location marked on package. Include manufacturer's published installation instructions, fasteners, and installation tools.
- D. Retain finish protective coverings until final cleanup.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers for Toilet Accessories: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Bradley Corporation (Basis of Specification – unless noted otherwise)
 - 2. Bobrick Washroom Equipment
 - 3. American Specialties, Inc.
 - 4. AJW Architectural Products
 - 5. Architect Approved Equivalent
- B. Available Manufacturers for Miscellaneous Accessories: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include those listed below or Architect Approved Equivalents to the specified products.

2.02 TOILET/SHOWER ROOM ACCESSORIES

- A. Items
 - 1. Surface Mounted sensor activated paper towel dispenser including batteries – Bradley 2494.
 - 2. Surface Mounted sensor activated paper towel dispenser including batteries – Georgia Pacific Pro enMotion® 8" stainless steel recessed dispenser, Model # 59466A. (requires Owner to purchase paper from GP).
 - 3. Semi-Recessed Paper Towel Dispenser (C-Fold)/Waste Receptacle – Bradley 238-10.
 - 4. Surface Mounted waste receptacle – Bradley 357 (including vinyl coated liner).
 - 5. Vanity mounted manual soap dispenser – Bradley 6326-68 (with 6" spout length).

6. Vanity mounted touchless soap dispenser with individual tank – Bradley 6-3100 (Battery Operated) Polished Chrome Finish
7. Wall mounted manual liquid soap dispenser – Bradley 6542
8. Wall mounted touchless soap dispenser – Bradley 6A01-11 (Battery Operated)

2.03 TOILET COMPARTMENTS

A. Items

1. Surface-mounted multi-roll toilet tissue dispenser - Bradley 5402.
2. Grab Bars – Bradley 812-2 with peened gripping surface – where shown on contract drawings.
 - a. Mounting: concealed with grab bar welded to the mounting flange, mounting flange secured to substrate with stainless steel screws.
 - b. Escutcheon: Cover plate escutcheon is decorative only.
 - c. Surface finish: satin.
 - d. Diameter: 1-1/2 in.; uniform around curves.
 - e. Configurations: as shown on Contract Drawings.
3. Surface mounted sanitary napkin disposal – Bradley 4781-15 where shown on Contract Drawings.
4. Surface mounted stainless steel raised edge shelf - American Specialties, Inc., 24" long, Model #0690 or Architect Approved Equivalent. Locate one shelf on the rear wall above each water closet and at other locations shown on the Contract Drawings. Install shelf with top of shelf 44" maximum above finished floor.

2.04 SHOWER AREA

A. Items:

1. Towel Bar: Stainless Steel, Length 24 inches - Bradley 908-24.
2. Robe Hook: Stainless Steel, Double Hook, standard duty. - Bradley 9124.
3. Shower Curtain Rods: Bradley 9539
 - a. Style: 1-1/4" diameter, straight--match shower width.
 - b. Mounting: Concealed
4. Microban anti-bacterial shower curtain: Bradley 9537 – shower width + 6" wide, white, custom length to overlap inside of terrazzo base by two inches.
5. Curtain Hooks: Bradley 9536.
6. Surface Mount Shower Soap Dish: Bradley 9014.

2.05 ADA SHOWER AREA

A. Items:

1. Towel Bar: Stainless Steel, Length 24 inches - Bradley 908-24.
2. Robe Hook: Stainless Steel, Double Hook, standard duty. - Bradley 9124.
3. Shower Curtain Rods:
 - a. Rod size and material: 1-1/4 in. - Bradley 9539.
 - b. Mounting: Concealed mounting with snap-on vandal resistant protective escutcheons.
4. Microban anti-bacterial shower curtain: Bradley 9537 – shower width +6" wide, white
5. Curtain Hooks: Bradley 9536.
6. Grab Bars - Bradley 800 Series with peened gripping surface.
 - a. Mounting: concealed with grab bar welded to the mounting flange, mounting flange secured to substrate with stainless steel screws.
 - b. Escutcheon: Cover plate escutcheon is decorative only.
 - c. Surface finish: Satin.
 - d. Diameter: 1-1/2 in.; uniform around curves.
 - e. Configuration: shown on drawings.

7. Fold Down Shower Seat (Reversible): Bradley 9594 Configuration as shown on Contract Drawings.
8. Surface Mount Shower Soap Dish: Bradley 9014.

2.06 CUSTODIAL AREAS

- A. Mop and Broom Holders (without shelf)
 1. Configuration: holders - Bradley 9954 304 Stainless Steel.
 2. Length: 36 inches.
 3. One per Room

2.07 TUBULAR STEEL WALL RACKS (COAT RACKS)

- A. Model DS-xHA single shelf with hanger pole as manufactured by Magnuson Group, 1400 Internationale Parkway, Woodbridge, IL 60517, www.magnusongroup.com or Architect approved equivalent.
 1. Finish: Powder-coated steel brackets with clear anodized aluminum shelf tubes and a nickel chrome plated 1" hanger bar.
 2. Colors: Medium Gray, Sandstone, Black, Lunar White or Bronze Metallic. Color to be selected by Architect.
 3. Provide wall racks in lengths as shown on Contract Drawings.
- B. Include five (5) hangers per foot of wall rack.
 1. Open hook #MG-17OHN wire steel hangers by Magnuson Group.

2.08 APPARATUS BAY BROOM CENTER RACKS

- A. GearGrid Broom Center by GearGrid, LLC, 670 SW 15th Street, Forest Lake, MN 55025, Phone: 888-643-6694
 1. Size: 25 1/4" x 72"
 2. Accessories: Five tool hangers and two 4-prong racks per broom center
 3. Finish: TGIC powder coat; Color: To match gear lockers or as selected by Architect from manufacturer's standard colors.

2.09 BENCHES

- A. Tufftec by Scranton Products, 1 1/2 inch thick with edges rounded to 1/4" radius solid HDPE.
 1. 9 1/2" Wide.
 2. Quantities and lengths: As per Contract Drawings.
 3. Pedestals: Aluminum, 16 inches high, secured to bench tops with stainless steel tamper resistant Torx head screws and secured to the floor with lead expansion shields and 2" long stainless-steel machine bolts.
 4. Color as selected by Architect from manufacturer's standard colors.

2.10 ACCESSIBLE BENCHES

- A. 5/4" Thick maple hardwood bench.
 1. Quantities and sizes: As per Contract Drawings.
 2. Pedestals 1 1/4" diameter steel tubing with 10 ga. Flanges, secured to bench tops with stainless steel tamper resistant Torx head screws and secured to the floor with lead expansion shields and 2" long stainless-steel machine bolts. Color as selected by Architect from manufacturer's standard colors.
 3. 2" x 2" x 1/4" Stainless steel wall angle support full length of Bench less 2". Attach angle to bench and wall with stainless-steel Tamper resistant Torx head screws at 8" o.c.

2.11 CLOSET RODS

- A. Stanley: Adjustable round closet rod V7052 with center support.
 - 1. Finish: White

2.12 BIOHAZARD POLY-WASTE CONTAINER (RED BAG WASTE RECEPTACLE)

- A. Eagle™ Step-On Biohazard Waste Container, 10 gallon, red biohazard poly-waste container, foot lever operation, Model #945BIO, available from Eagle Manufacturing Co., 2400 Charles Street, Wellsburg, WV 26070, Phone: 304-737-3171.

2.13 ELECTRIC HAND DRYERS

- A. Dyson Airblade V (HU02)
 - 1. Depth: 4".
 - 2. Rated Power: 1,000 w.
 - 3. Filtration: 99.97% particulate efficiency HEPA filter with anti-microbial coating.
 - 4. NSF Certified: Yes.
 - 5. Rated Operating Noise Power: 79 dba.
 - 6. Finish: Sprayed Nickel.
 - 7. Electrical Requirements: 110-127 Volt, AC.
 - 8. Warranty: Five (5) years limited parts and labor.
- B. ThinAir® TA-ABS Surface Mounted Electric Hand Dryer, 110V/120V, ADA compliant as manufactured by Excel Dryer Inc.
 - 1. Warranty: Five (5) years limited parts and labor.
- C. SPEEDFLOW® Plus Model M17A-UL High Speed Hand Dryer, 110V/120V, ADA compliant as manufactured by Saniflow Hand Dryer Corporation.
 - 1. Warranty: Five (5) year limited warranty.

2.14 DIAPER CHANGING STATION

- A. Bradley Model 962 -- Recess Mounted Stainless Steel Baby Changing Station.
- B. Koala Kare Products, 6982 S. Quentin St., Centennial, CO 80112, Phone: 888-733-3456.
 - 1. Model Number: KB310-SSRE, Stainless Steel-Clad Recess mounted horizontal Baby Changing Station with polyethylene interior.

2.15 FASTENERS – ALL ACCESSORIES

- A. Provide bolts, screws, plates, anchors, toggles, and other fastening devices for permanent and secure installation to produce loading requirements where applicable and which are designed specifically for adjoining construction.
- B. All fasteners: Stainless steel.
- C. At Substantial Completion, install new batteries in all battery operated devices.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pursuant to manufacturers published instructions.

- B. Install plumb, level, and square, free of bowing, warping, or racking.
- C. Install at elevations pursuant to applicable codes, manufacturers published instructions, and as may be modified on Drawings.
 - 1. Wall Racks (Coat racks) to be mounted at 5'-0" and ADA Coat Racks at 4'-0" A.F.F. unless noted otherwise. Coordinate with Architect.
 - 2. Diaper Changing Station to be mounted with top of unit 46 ½" A.F.F.
 - 3. Wall mounted soap dispensers shall be mounted a minimum of 12" horizontally from electric hand dryers.
 - 4. Hand Sanitizer Dispenser to be mounted with bottom of unit 44" A.F.F.
- D. All installations must fasten into solid structure or blocking.
- E. Fit flanges, escutcheons, and edges tight against finish surface.
- F. Provide all accessories keyed alike. Turn over all keys and/or access tools to the Owner.
- G. Provide hand sanitizer bottles and batteries to the Owner. Do not install in units where they would get utilized by construction personnel.
- H. Remove and discard finish protective coverings.
- I. Provide batteries in all accessories requiring batteries.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Window shades and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.
- B. Section 092116 - Gypsum Board Assemblies: Substrate for window shade systems.
- C. Section 095100 - Acoustical Ceilings: Shade Pockets, pocket closures and accessories.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 012100 - Allowances, for cash allowances affecting this section.

1.04 REFERENCE STANDARDS

- A. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2019.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.
- C. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute; www.c2ccertified.org/products/registry.
- D. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.
- F. WCMA A100.1 - Standard for Safety of Window Covering Products; 2022.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.
 - 2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.
- B. Sequencing:
 - 1. Do not fabricate shades until field dimensions for each opening have been taken.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.06 SUBMITTALS

- A. See Section 013300 - SUBMITTALS, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.

- C. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
- D. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.
- E. Selection Samples: Include fabric samples in full range of available colors and patterns.
- F. Samples:
 - 1. Minimum size 6 inches square, representing actual materials, color and pattern of each shade type material.
 - 2. Metal finishes: 2 inch square samples of entire color offering for selection by the Architect.
- G. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.
- I. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- J. Maintenance contracts.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum 5 years of documented experience.
 - 1. Factory training and demonstrated experience.

1.08 MOCK-UP

- A. Mock-Up: Provide full size mock-up of window shade complete with selected shade fabric including sample of seam when applicable.
 - 1. Obtain Architect's approval of light and privacy characteristics of fabric prior to fabrication.
 - 2. Full-sized mock-up will become the property of the Owner to be used for spare parts.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Schedule delivery after building is enclosed and construction is Substantially Complete.
- B. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- C. Handle and store shades in accordance with manufacturer's recommendations.

1.10 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.11 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
 - 1. Shade Hardware: One year.
 - 2. Fabric: One year.
 - 3. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manually Operated, Roller Shades:
 - 1. Draper, Inc; Clutch Operated FlexShade - Single and Dual Roller type shade systems: www.draperinc.com/sle.
 - 2. Mecho Systems Single and Dual Roller type shade systems.
 - 3. Architect approved equivalent
 - 4. Substitutions: See Section 016100 - Product Requirements and Section 012500 - Substitution Procedures.
- B. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 WINDOW SHADE APPLICATIONS

- A. Shades at windows as indicated:
 - 1. Type: Roller shades.
 - 2. Fabric: As selected by the Architect from the manufacturer's full line of fabrics..
 - 3. Color: As selected by Architect from manufacturer's full range of colors.
 - 4. Mounting: Inside (between jambs).
 - 5. Operation: Manual.

2.03 SINGLE ROLLER SHADES

- A. General:
 - 1. Provide shade system components that are capable of being removed or adjusted without removing mounted shade brackets or cassette support channel.
 - 2. Provide shade system that operates smoothly when shades are raised or lowered.
 - 3. Provide shade system that is Cradle-to-Cradle certified and listed in C2C (DIR).
- B. Roller Shades Type RS-1 - Basis of Design: MechoShade Systems LLC; Mecho/5 System; www.mechoshade.com/#sle.
 - 1. Description: Single roller, manually operated fabric window shades.
 - a. Drop Position: Regular roll.
 - b. Mounting: Recess mounted in ceiling pocket.
 - 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - a. Material: Steel, 1/8 inch (3 mm) thick.
 - 3. Roller Tubes:
 - a. Material: Extruded aluminum.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.

- c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
 - d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
- 4. Hembars: Designed to maintain bottom of shade straight and flat.
- 5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
 - a. Provide a permanently lubricated brake assembly mounted on a oil-impregnated hub with wrapped spring clutch.
 - b. Brake must withstand minimum pull force of 50 pounds (22.7 kg) in the stopped position.
 - c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
- 6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pound (43 kg) minimum breaking strength. Provide upper and lower limit stops.
 - a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
- 7. Accessories:
 - a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; clear anodized finish.
 - 1) Fascia to be capable of installation across two or more shade bands in one piece.
 - 2) Provide single fascia to accommodate regular roll shades.
 - 3) Provide front and rear double fascia.
 - 4) Color: White.
 - 5) Profile: Square.
 - 6) Configuration: Captured, fascia stops at captured bracket end.
 - b. Ceiling Pockets: Premanufactured metal shade pocket with removable closure panel and ceiling tile support, for recess mounting in acoustical tile or drywall ceilings; size and configuration as indicated on drawings.

2.04 ACCESSORIES

- A. Endcaps: 1028 steel stamping. Complete with adapter roller bracket. Installs to wall or ceiling. Accepts fascia.
- B. Nominal size: 4-3/4 inches deep by 7 inches high by length required by window opening, with a return of 1-11/16 inches.
- C. Fascias: Size as required to conceal dual shade mounting.
 - 1. Fascia: L-shaped cover of extruded aluminum, 0.060 wall. Assembly snaps onto endcaps without exposed fasteners. Clear Anodized (standard) or color powder coat finish as selected by the Architect / Owner.
 - 2. Style: As selected by Architect from shade manufacturer's full selection.
- D. Brackets and Mounting Hardware: As recommended by manufacturer for mounting configuration and span indicated.
- E. Pocket Head Box Installation:
 - 1. Housing case:
 - a. Rectangular enclosure for two rollers fabricated from 18 Gauge steel with white paint finish.
 - b. Housing designed to be installed separately from shade as part of ceiling system installation. Shade and operating mechanism can be site installed later after construction operations that might damage shade are complete.

- c. Nominal size: 6-1/2 inches wide by 8-1/2 inches deep by length required by window opening.
 - d. Closure panel: Extruded aluminum bottom closure panel forms slot for passage of shades and is removable for access to shades and operating mechanisms.
- F. Number Plates: Stamp number on opening and coordinate with marked packaging.
- G. Fasteners: Non-corrosive, and as recommended by shade manufacturer.
- H. Rescue Window Labels: One window and associated shade per classroom or teaching area shall be deemed a "rescue window", for egress in case of emergency. All rescue windows shall comply with SED regulations and applicable codes and shall include a conforming label. At a minimum, provide the following:
 - 1. Letters: bright yellow background with black letters
 - 2. Label size: 3 inches high by 5 inches wide
 - 3. Text: the words "RESCUE WINDOW" must be visible from Interior and Exterior sides of each rescue window.
 - 4. Any window treatment/coverings at each of these locations must also have labels.
 - 5. Visible window operating instructions shall be provided if operation is not readily apparent.

2.05 ROLLER SHADE FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Fabricate shades to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch (13 mm) space between bottom bar and window stool.
 - 2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.
- C. Dimensional Tolerances: As recommended in writing by manufacturer.
- D. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

- A. Field verify window dimensions prior to fabrication.
- B. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- C. Coordinate with window installation and placement of concealed blocking to support shades.
- D. Coordinate installation of recessed housings with construction of suspended Acoustical Panels ceilings.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Installation Tolerances:
 - 1. Inside Mounting: Maximum space between shade and jamb when closed of 1/16 inch (1.5 mm).
 - 2. Maximum Offset From Level: 1/16 inch (1.5 mm).
- C. Adjust level, projection and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.
- D. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours training by manufacturer's authorized personnel at location designated by the Owner.

3.06 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.07 MAINTENANCE

- A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

END OF SECTION

SHELVING AND CASEWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

- A. This section includes, but not limited to, the following:
 - 1. Cabinet Shelving
 - 2. Standards and Brackets
 - 3. Shelving
 - 4. Window Sills
 - 5. Window Surrounds
 - 6. Office Work Station Countertops
 - 7. Wall and Base Cabinets
 - 8. Electrostatic Dissipative (ESD) Countertops
 - 9. Stainless Steel end panels
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 061000 - Rough Carpentry for blocking within walls to adequately support casework.
 - 2. Section 079200 - Sealants for caulking of casework and/or countertops to abutting walls.
 - 3. Section 092116 - Gypsum Board Assemblies.
 - 4. Section 096513 - Resilient Base and Accessories for application of rubber base to casework.
 - 5. Division 22 Plumbing - Furnishing, installation, and hook-up of sinks, fixtures, outlets, strainers, tailpieces, traps, vacuum breakers, stops, etc., shall be performed by the Plumbing Contractor in accordance with IPC of New York State and local building codes. In all cases, sink cutouts shall be by the Casework Contractor and coordinated with the Plumbing Contractor.
 - 6. Division 26 Electrical - Furnishing, installation, and final connections of wiring, conduit, and/or electrical items within the casework including ESD countertops shall be performed by the Electrical Contractor in accordance with IEC of New York State and local codes.

1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. Architectural Woodwork Institute (AWI) Quality Standard: "Architectural Woodwork Quality Standards".
- C. AWI Custom grade.
- D. ANSI/KCMA A161.1 "Recommended Performance and Construction Standards for Kitchen and Vanity Cabinets".
- E. ANSI 161.2 "Performance Standards for Fabricated High Pressure Decorative Laminate Countertops".

1.04 SUBMITTALS

- A. Division 01 Section "LEED Certification Procedures" for additional LEED requirements.
- B. Division 01 Section "VOC Content Restrictions" for additional LEED requirements.
- C. Submit pursuant to Section 013300 - Submittal Procedures.
- D. Submit pursuant to Section 016100 - Product Requirements.
- E. Product Data: Submit manufacturer's technical product data and installation instructions indicating materials, hardware, and finishes used in fabrication of cabinets, as required to show compliance with specifications.
- F. Shop Drawings: Submit shop drawings indicating location and size of each type of cabinet and countertops, accessories, materials, finishes, hardware types and locations, fillers, etc. Include fully dimensioned plans and elevations and indicate details of anchorage to countertop and to walls.

1.05 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workers familiar with the work and according to manufacturers' recommendations and/or industry standards.
- B. Source limitations for cabinets: Obtain cabinets and vanity supports through one source from a single manufacturer/fabricator.
- C. Verify casework dimensions to field measurements.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturer's published instructions.
- B. Protect against moisture exposure and damage.
- C. Protect cabinets during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- D. Do not deliver cabinets until painting, wet work, grinding and similar operations, which could be performed before installation of cabinets, have been completed in installation areas.

1.07 JOB CONDITIONS

- A. Do not deliver or install any items of this specification until spaces are enclosed and weathertight. Comply with cabinet manufacturer's recommendations for temperature and humidity requirements in cabinet installation areas. Do not install cabinets and countertops until required temperature and relative humidity have been stabilized and will be maintained in installed areas.
- B. Maintain temperature and humidity in installation areas as required to maintain moisture content of installed cabinet work within a tolerance range of the optimum moisture content acceptable to cabinet manufacturer, from date of installation through remainder of construction period.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Plastic laminates to be selected from Nevamar, Formica, Wilsonart or Architect approved equivalent.
 - 1. Sheet Thickness: 0.048 inches for countertops, edge boards and backsplash.
 - 2. Countertops shall have white melamine laminated backer sheets at underside.
 - 3. Colors to be selected by Architect from manufacturer's standard colors.
- B. Electrostatic Dissipative (ESD) Laminate:
 - 1. Nevamar® ESD, Pionite® ESD or Architect approved equivalent.
 - 2. Provide grounding flush mount insert system at spacing as recommended by plastic laminate ESD manufacturer.
 - 3. Colors to be selected by Architect from manufacturer's standard colors.
- C. Particle Board
 - 1. Three-layer, Grade A, 45 Lb. minimum.
 - 2. Thickness: As shown on Contract Drawings or as required to produce the finish product shown on Contract Drawings.
- D. Plywood
 - 1. AC Exterior Grade, u.n.o.
- E. Metal Brackets & Supports
 - 1. Countertop Brackets
 - a. 1/8" steel work station brackets as manufactured by A & M Hardware, Inc., 400 W. Gramby Street, Manheim, PA 17545, Phone (888) 647-0200 or Architect approved equivalent.
 - b. Size: as shown on Drawings.
 - c. Finish: pre-finished as selected by Architect from manufacturer's standard colors.
 - 2. Adjustable Shelf Brackets
 - a. Standards: Item No. 82 as manufactured by Knape & Vogt Manufacturing Company, 2700 Oak Industrial Drive NE, Grand Rapids, MI 49505, Phone (800) 235-1561. Sizes as shown on Drawings.
 - b. Brackets: Item No. 182 as manufactured by Knape & Vogt Manufacturing Company, 2700 Oak Industrial Drive NE, Grand Rapids, MI 49505, Phone (800) 235-1561. Sizes as shown on Drawings.
 - c. Color to be selected by Architect from Almond, Black, Titanium and White.

2.02 COMPONENTS

- A. Wall Cabinets
 - 1. Bottoms, Side Panels and Backs: 3/4" 45 lb. particle board with white melamine finish interior with high pressure laminate (GP-50) edge banding to match faces and doors.
 - 2. Doors: 3/4" 45 lb. particle board with white melamine finish interior with high pressure laminate (GP-50) edge banding and exterior faces.
 - 3. Unexposed Sides and Tops: 3/4" 45 lb. particleboard with white melamine finish. If there is to be no soffit above the wall cabinets, entire cabinet top area must be solid, allowing no chance for items to fall into or past cabinet from above.
 - 4. Provide 19ga polished stainless-steel end panels where shown on contract drawings.
- B. Drawers

1. Boxes: Constructed of 1/2" pre-finished birch plywood components joined with blind rabbeted corners and galvanized brads with square drive, flat head and self-countersinking heads (Equality Screw Co. #7650).
 2. Bottoms: 1/2" fiberboard with white melamine finish (trapped in grooves at all four sides).
 3. Horizontal Frame Rails (If applicable): Between drawers to be 3/4" x 3 1/2" white melamine with high pressure plastic laminate (GP-50) edge banding.
- C. Shelves
1. Adjustable Shelves Less than 32" in length: 3/4" 45 lb. particle board with white melamine finish; leading edge of shelf to be finished with high pressure laminate (GP-50) edge banding.
 2. Adjustable Shelves Greater than 32" in length: 3/4" 45 lb. particle board with white melamine finish with 2" x 3/4" apron at front edge; leading edge of shelf to be finished with high pressure laminate (GP-50) edge bonding.
- D. Base Cabinets
1. Tops, Bottoms, Side Panels and Backs: 3/4" 45 lb. particle board with white melamine finish interior with high pressure laminate (GP-50) edge banding to match faces and doors.
 2. Doors and Drawer Faces: 3/4" 45 lb. particle board with white melamine finish interior with high pressure laminate (GP-50) edge banding and exterior faces.
 3. Unexposed Sides: 3/4" 45 lb. particleboard with white melamine finish.
 4. Provide 19ga polished stainless-steel end panels where shown on contract drawings.
 5. Kick Bases: Fabricated with 3/4" white melamine balanced material (to receive vinyl base by others) (U.N.O.)
- E. Countertops (Work Surfaces)
1. Plastic Laminate Counters: Fabricated with 3/4" 45 lb. particle board (build down to 1 1/2" thickness) and (GP-50) plastic laminate edge banding, top surface and backsplash; all tops to have white melamine laminated backer sheet at underside.
 - a. Provide ESD laminate on work surfaces called for on the Contract Drawings.
 2. Plastic Laminate Backsplash: Fabricated with 3/4" white melamine balanced material and to be attached with #8 x 2" screws (Equality Screw Co. #7650) and sealed with adhesive caulk at all locations.
- F. Window Sills
1. Plastic Laminate Window Sills: Fabricated with 3/4" 45 lb. particle board (build down to 1 1/2" thickness unless noted otherwise on Contract Drawings or required to cover gap between bottom of window sill and finished vertical wall surface). Plastic laminate all exposed surfaces of the window sill including:
 - a. Top surface
 - b. Front face
 - c. Ends of sill "ears"
 - d. Exposed portion of bottom of sill that extends out from the wall
 - e. Caulk joint on underside of sill between bottom of sill and finished wall.
- G. Window Recessed Surrounds
1. Plastic Laminate Window Surrounds: Where shown on Contract Drawings provide window jambs and window head fabricated with 3/4" 45 lb. particle board and plastic laminate covering all visible surfaces. Surrounds shall be secured with hidden fasteners and adhesives. Surrounds shall align with pre-finished portions of the window unit. Jambs shall align with the same point on each side of the window frame.

2.03 HARDWARE

- A. Hinges: Blum, 170-degree, self-closing, full overlay.

- B. Hinge Mounting Plates: Blum Steel Wing Plate (Blum #17318100); installed into door with Nylon expansion inserts (per Blum specifications).
- C. Drawer Slides: Accuride #3832; full-extension attached to cabinet with:
- D. System Screws: Blum 5mm x 10mm zinc plated (Blum #661.1000) attached to drawer box with: flat head zinc screws #6 x 1/2" (Blum #6062).
- E. Cabinet Handles: 3 1/2" clear anodized satin-finished aluminum bent pulls (Hafele #116.39.446).
- F. Shelf Support System: Polished galvanized 5mm shelf supports with collar (Hafele #282.43.905).
- G. Door and Drawer Face Bumpers: Blum 4mm x 1.5mm resilient plastic bumper (Blum ETP1950).
- H. Continuous Hinge: Stanley heavy gauge #314-1/4 solid brass, bright brass finish with solid brass screws.
- I. Grommets: 2" round plastic grommets. Color as selected from Manufacturer's standard colors.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect substrate and conditions under which cabinets are to be installed.

3.02 BLOCKING

- A. Contractor shall provide blocking in walls for casework support.

3.03 CASEWORK INSTALLATION

- A. Install casework (cabinets, shelving and other plastic laminate covered wood work) plumb, level, true and straight with no distortions. Shim as required using concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips and molding as indicated or required, and in finish to match.
- B. Anchor cabinets securely in place with concealed (when doors and drawers are closed) fasteners, anchored into structural support members of wall construction. Comply with manufacturer's instructions for support of units.
- C. Complete hardware installation and adjust doors and drawers for proper operation. Doors and drawers shall be centered.

3.04 COUNTERTOP (WORK SURFACES) INSTALLATION

- A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturers requirements.
- B. Install countertops level, true and straight in longest lengths possible with no distortions. Shim as required using concealed shims.
- C. Scribe countertops to abutting finishes for accurate fit.

- D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- E. Anchor countertops to base cabinets and/or countertop supports.
- F. The party responsible for provision of countertops is also responsible for provision of penetrations through countertop; penetrations include but are not limited to cutouts for sinks, faucets, grommets and soap dispensers.
- G. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
- H. ESM Countertops:
 - 1. Provide flush mount grounding inserts in countertop surface at spacing as recommended by ESD laminate manufacturer.
 - 2. Provide dual banana jack terminals (Wrist Strap Ground) in front of work surface grounded to the flush mount insert system.

3.05 WINDOW SILL AND WINDOW SURROUND INSTALLATION

- A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturers requirements.
- B. Install window sills and window surrounds, if any, plumb, level, true and straight with no distortions. Shim as required using concealed shims. Where sills and/or surrounds abut other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips and molding as indicated or required, and in finish to match.
- C. Anchor sills and surrounds securely in place with concealed fasteners, anchored into structural support members of wall construction.

3.06 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed upon completion of installation.
- B. Clean exposed and semi-exposed surfaces, touch-up as required. Use only cleaning products approved by the manufacturer of the surfaces being cleaned.
- C. Remove and refinish damaged or soiled areas.
- D. Make final adjustments to doors and drawers. Doors shall swing freely, catches shall hold securely, and all doors shall be aligned both vertically and horizontally. Drawers shall open and close smoothly, without binding and without excessive side play.
- E. Protection: Provide 10-mil plastic or other suitable water-resistant covering over countertop and work surfaces. Tape to underside or countertop/work surface to securely hold protection material in place. Remove protection material and all tape at Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Epoxy resin worksurfaces and accessories.
 - 2. Setting materials.

1.02 REFERENCES

- A. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- B. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.
- C. ASTM D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position; 2018.
- D. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2023.
- E. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between ?30°C and 30°C with a Vitreous Silica Dilatometer; 2016.
- F. ASTM D785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials; 2023.
- G. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2016.
- H. ASTM D792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; 2020.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018a.
- J. ISO 9001 - Quality Management Systems — Requirements; 2015.
- K. NSF 51 - Food Equipment Materials; 2023.
- L. SCS (CPD) - SCS Certified Products; Current Edition.
- M. SEFA 3 - Laboratory Work Surfaces; 2010.
- N. GREENGUARD Environmental Institute (GREENGUARD):
 - 1. Indoor Air Quality Certification Program.
 - 2. Children and Schools Certification Program.
- O. International Organization for Standardization ISO 9001 - Quality Management Systems - Requirements.
- P. NSF International / American National Standards Institute NSF 51 - Food Equipment Materials.
- Q. Scientific Certification Systems SCS (CPD)- Recycled Content Certifications.
 - 1. Scientific Equipment and Furniture Association SEFA 3 - Work Surfaces.

1.03 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings:
 - a. Submit plan, section, elevation and perspective drawings necessary to describe and convey layout, profiles, and product components, including edge conditions, joints, fitting and fixture locations, anchorage, accessories, and finish colors.
 - b. Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on Shop Drawings.
 - c. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
 - 2. Product Data: Manufacturer's data sheets on each product to be used, including:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods.
 - 3. Samples:
 - a. Selection samples: For each finish product specified, submit complete set of color chips representing manufacturer's full range of standard colors.
 - b. Verification samples: For each finish product specified, submit samples representing actual product color; supplied product color and gloss may vary slightly from supplied samples.
- B. Quality Control Submittals:
 - 1. Test Reports: Certified test reports or recognized evaluation reports showing compliance with specified performance characteristics and physical properties.
- C. Closeout Submittals:
 - 1. Maintenance Data:
 - a. Provide maintenance, cleaning, and life cycle information.
 - b. Include recommended cleaning materials and procedures, and list of materials detrimental to epoxy resin.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Primary products furnished by single manufacturer with minimum [10] [] years [documented] experience in work of this Section.
 - 2. Products manufactured in ISO 9001 certified facility.
- B. Installer Qualifications: Minimum three (3) years documented experience in work of this Section.
- C. Mockup:
 - 1. Construct worksurface mockup, six (6) feet wide x full depth.
 - 2. Include worksurface, and trim.
 - 3. Locate as directed by the Owner's Construction Representative.
 - 4. Approved mockup may remain as part of the Work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Use pallets larger than sheets during transportation.
 - 2. Package materials to prevent damage during shipping and handling.
- B. Storage:

1. Store products in enclosed area protected from ultraviolet.
 2. Store products in manufacturer's unopened packaging until ready for installation.
 3. Store panels using protective dividers to avoid damage to surfaces.
 4. For horizontal storage, store sheets on pallets of equal or greater size than sheets with protective layer between pallet and sheet and on top of uppermost sheet.
 5. Do not store sheets or fabricated panels vertically.
- C. Handling:
1. If protective film is provided, do not remove until panel has been installed.
 2. Handle sheets to prevent damage.
 3. Remove stickers immediately after installation.

1.06 PROJECT CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's limits.
- B. Avoid direct exposure of products to sunlight.
- C. Do not use worksurfaces as bench, ladder, or seating.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Contract Documents are based on products by Durcon, Incorporated, 206 Allison Drive, Taylor, TX 76574, 512-595-8000, www.durcon.com.
- B. Architect approved equivalent.
- C. Substitutions: See Section 016100 - Product Requirements and Section 012500 - Substitution Procedures.

2.02 MATERIALS

- A. Solid Epoxy Resin:
1. Sheets cast from modified epoxy resin and non-asbestos inert fillers; compounded mixture cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.
 2. Sheets cast from modified epoxy resin and non-asbestos inert fillers with 10 percent of filler certified as post-consumer glass by SCS; compounded mixture cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.
 3. Sheets monolithic throughout without surface coating application.
 4. Certified to NSF 51.
 5. Certified by GREENGUARD under Indoor Air Quality and Children and Schools Certification Programs.
 6. Physical properties; minimum acceptable physical performance in accordance with SEFA 3 testing procedures:
 - a. Density/specific gravity: Tested to ASTM D792; minimum test rating of 133.6 lb/ft³ or 2.14 g/cm³.
 - b. Rockwell hardness: Tested to ASTM D785; minimum M scale rating of 109.
 - c. Fire resistance: tested to ASTM D635; classified as self-extinguishing.
 - d. Surface burning characteristics: Tested to ASTM E84; flame spread index 5 and smoke developed index of 185.
 - e. Coefficient of linear thermal expansion: Tested to ASTM D696; rating of 1.2 x 10⁻⁵ in/in degrees F or 2.15 x 10⁻⁵ mm/mm degrees C.

- f. Heat deflection: Tested to ASTM D648; maximum 293 degrees F or 145 degrees C .
- g. Flexural strength: Tested to ASTM D790; minimum rating 12.6 KPSI or 87 Mpa.
- h. Flexural modulus: Tested to ASTM D790; 3240 KPSI or 22.4 mm degrees C.
- i. Water absorption, 24 hours: tested to ASTM D570; maximum 0.03% by weight.
- j. Compression strength: Tested to ASTM D695; minimum 32.7 kpsi or 226 Mpa.
- k. Chemical resistance; minimum acceptable chemical resistance performance in accordance with SEFA 3:

REAGENT TESTED	METHOD	RATING
Amyl Acetate	A	0
Ethyl Acetate	A	0
Acetic Acid, 98%	B	0
Acetone	A	1
Acid Dichromate, 5%	B	0
Butyl Alcohol	A	0
Ethyl Alcohol	A	0
Methyl Alcohol	A	1
Ammonium Hydroxide, 28%	B	0
Benzene	A	1
Carbon Tetrachloride	A	0
Chloroform	A	1
Chromic Acid , 60%	B	0
Cresol	A	0
Dichloroacetic Acid	A	0
Dimethyl formamide	A	0
Dioxane	A	0
Ethyl Ether	A	0
Formaldehyde, 37%	A	0
Formic Acid, 90%	B	0
Furfural	A	1
Gasoline	A	0
Hydrochloric Acid, 37%	B	0
Hydrofluoric Acid , 48%	B	0
Hydrogen Peroxide, 28%	B	0
Tincture of Iodine	B	0
Methyl Ethyl Ketone	A	0
Methylene Chloride	A	0
Monochlorobenzene	A	0
Naphthalene	A	0
Nitric Acid , 20%	B	0
Nitric Acid, 30%	B	1

Nitric Acid, 70%	B	1
Phenol, 90%	A	0
Phosphoric Acid, 85%	B	1
Silver Nitrate, Saturated	B	0
Sodium Hydroxide, 10%	B	1
Sodium Hydroxide, 20%	B	1
Sodium Hydroxide, 40%	B	1
Sodium Hydroxide, Flake	B	1
Sodium Sulfide, Saturated	B	2
Sulfuric Acid, 25%	B	1
Sulfuric Acid, 85%	B	2
Sulfuric Acid, 96%	B	3
Sulfuric Acid, 85% & Nitric Acid , 70%, Equal Parts	B	3
Toluene	A	1
Trichloroethylene	A	0
Xylene	A	0
Zinc Chloride, Saturated	B	0

Testing Method Descriptions:

Method A - Volatile chemicals (organic solvents): Cotton ball saturated with test reagent is placed in one-ounce bottle (20 x 75mm test tube or similar container) with reservoir of liquid above ball. Container is inverted on test material for period of 24 hours at standard temperature 23 degrees C plus or minus 2 degrees C (73 degrees F plus or minus 4 degrees F).

Method B - Non Volatile Chemicals: Five drops (1/4 cc) of test reagent are placed on test material surface. Reagent is then covered with watch glass (25 mm) for period of no less than 24 hours at standard temperature of 23 degrees C plus or minus 2 degrees C (73 degrees F plus or minus 4 degrees F).

Result Definitions:

0 - No Effect: No detectable change in material surface.

1 - Good: Slight detectable change in color or gloss but no change to function or life of work surface material. **2** - Fair: Slight surface etching or severe staining. Clearly discernible change in color or gloss but no significant impairment of surface life or function.

3 - Poor: Pitting, cratering or erosion of work surface material; obvious and significant deterioration. Objectionable change in appearance due to surface discoloration.

- B. Color: as indicated on the drawings or as selected by the Architect from the manufacturer's full color offering.

2.03 ACCESSORIES

- A. Provide solid epoxy resin laboratory shelving and countertops where indicated.
- B. Installation Materials: Manufacturer's joint adhesive, panel adhesive, and sealants as required to suit project conditions.

2.04 FABRICATION

- A. Fabricated tops and accessories in accordance with manufacturer's recommendations, approved Shop Drawings, and SEFA 3.
- B. Epoxy Resin Worksurfaces:
 - 1. Thickness: 1-1/4 inches (32 mm) unless indicated otherwise.
 - a. Check each approved shop drawing sheet at factory for required thickness.
 - b. Maximum variation in thickness: plus or minus 1/16 inch (1.6 mm) from corner to corner.
 - 2. Warpage:
 - a. Inspect tops for warpage prior to fabrication by placing on true flat surface.
 - b. Maximum allowable warpage: 1/16 inch (1.5 mm) in 36 inch (900 mm) span or 3/16 inch (4.5 mm) in 96 inch (2400 mm) span.
 - 3. Fabrication:
 - a. Shop fabricate in longest practical lengths.
 - b. Bond joints with highly chemical resistant cement with properties and color similar to base material.
 - c. Provide 1/8 inch (3 mm) drip groove at underside of exposed edges, set back 1/2 inch (13 mm) from face.
 - d. Finish exposed edges.
 - 4. Fabricate tops as indicated on the drawings at epoxy sink locations.
 - 5. Edge treatment: As indicated on Drawings.
 - 6. Corner treatment: exposed corners shall be eased slightly for safety.
 - 7. Back and end splashes:
 - a. Supplied loose for field installation.
 - b. Same material and thickness as worksurfaces.
 - c. Height: as indicated on the drawings.
 - d. Top-mounted end splash where worksurfaces abut adjacent construction at and locations indicated on Drawings.
 - 8. Joints: As indicated on Drawings.
 - 9. Make joints between two benches level.
 - 10. Locate joints away from sinks and over or near supports.
 - 11. Sink cutouts: As indicated on Drawings.
 - 12. Allowable tolerances:
 - a. Square: Plus or minus 1/64 inch (0.4 mm) for each 12 inches (300 mm) of length.
 - b. Location of cutouts and drilled openings: Plus or minus 1/8 inch (3 mm) of design dimension.
 - c. Size of cutouts and drilled openings: Plus 1/8 inch (3 mm) or minus 0 inches (0 mm).
- C. Epoxy Resin Sinks:
 - 1. Mold sinks from thermosetting epoxy resin.
 - 2. Mold interior corners to radius. Slope sink base to drain outlet.
 - 3. Provide 1-1/2 inch (38 mm) outlet with open ended standpipe; standpipe overflow 2 inches (50 mm) shorter than depth of sink.
 - 4. Unless otherwise indicated, fabricate sinks of drop-in design supported by upper flange from worksurface.
 - 5. Color: To match adjacent worksurface.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until cabinets have been installed.

- B. Confirm that surfaces to receive tops are plumb and level, with maximum deflection of 1/4 inch (6 mm) in 20 feet (6 m).

3.02 PREPARATION

- A. Clean surfaces just prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
 - 1. Install tops plumb and level.
- B. Scribe to adjacent surfaces in accordance with manufacturer's recommendations.
- C. Fasten tops to supporting construction with adhesives appropriate for use with adjoining construction and as recommended by manufacturer.
- D. Form field joints using manufacturer's recommended adhesive. Form joints to be inconspicuous and nonporous.
- E. Install countertops and laboratory shelving using fasteners and adhesive appropriate for use with adjoining construction and as recommended by manufacturer.

3.04 PROTECTION

- A. Protect installed products until completion of Project.
- B. Touch up, repair, or replace damaged products.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Furnish, assemble and install furniture and equipment as follows:
 - 1. Workstations, including lateral files, pedestals, and task chairs.
 - 2. Bookcases.
 - 3. Computer desks.
 - 4. Reading Tables.
 - 5. Task chairs.
 - 6. Occasional Table.
 - 7. Display cases.
 - 8. Stacking chairs.
 - 9. Others as indicated elsewhere in contract documents.

1.02 RELATED SECTIONS

- A. Section 096513 - Resilient Tile Flooring and Base.
- B. Section 096813 - Carpet Tiles.
- C. Section 096816 - Sheet Carpeting.

1.03 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications:
 - 1. Manufacturer is regularly engaged in design and manufacture of furniture of scope and type similar to requirements of this project for a period of not less than five (5) years.
 - 2. Manufacturer has successfully completed at least three (3) projects of scope and type similar to requirements of this project.
 - 3. Submit manufacturer's qualifications and list of projects.
- B. Installer Qualifications:
 - 1. Installer has completed at least three (3) projects in least five (5) years in which these products were installed.
 - 2. Submit installer qualifications.

1.04 SUBMITTALS

- A. Submit product data of furniture with manufacturer's photographs and features for each item specified, clearly marked with quantities required and finishes for each component.
- B. Submit shop drawings showing sizes, gauges, individual parts, and methods of assembly.
- C. Samples: Submit samples for initial selection purposes in form of furniture manufacturer's standard color cards, together with a 12-inch square fabric and/or finish sample (one color for each pattern and/or texture) for each item required.
- D. Furniture Schedule: Provide a schedule of furniture prepared by or under the supervision of supplier using same reference numbers, include all materials, finishes, colors, patterns, and options. Coordinate with electric and data.

1.05 DELIVERY AND STORAGE

- A. Deliver materials in ample time to facilitate the work of this section.

- B. All furniture shall be delivered to the job site in individually packed cartons complete with manufacturer's assembly and maintenance instructions.
- C. Furniture shall be stored in upright position on wood sills or on floors that will prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Furniture shall be designed for commercial application. Products designed for residential use is not acceptable.

2.02 SCHEDULE

- A. Provide furniture in accordance with the schedule included at the end of this section and as indicated on Furniture drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All manufactured items shall be installed in accordance with the manufacturer's directions and recommendations.
- B. All items shall be left free of blemishes, scratches and other imperfections before acceptance by the Owner.
- C. Erect all items neatly, plumb, level, true-to-line, accurately to required position, and with all anchorages highly secure.
- D. All colors, textures and patterns shall be selected by the Architect and approved by Owner.

3.02 CLEANING

- A. Upon completion of installation, remove all cardboard cartons and packing materials from the premises.
- B. All furniture and casework shall be left clean, free from prints, mars or surface imperfections.
- C. Replace or repair any damage to previously installed work as a result of the installation of furniture and casework.

Item	Manufacturer	Model	Description	Surface	Finish	Pattern	Color

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Check valves
- B. Ball valves

1.02 ABBREVIATIONS

- A. IBBM: Iron body, bronze mounted.
- B. OS&Y: Outside screw and yoke.
- C. WOG: Water, oil, gas.
- D. WSP: Working steam pressure.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets and specifications for each valve type.
- B. Valve Schedule: List type of valve, manufacturer's model number, and size for each service application.

1.04 MAINTENANCE

- A. Special Tools:
 - 1. One wrench for each type and size wrench operated plug valve.

PART 2 PRODUCTS**2.01 VALVES - GENERAL**

- A. Valve Standardization: Valves from one or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one manufacturer.
- B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating.
- C. Valve parts of same manufacturer, size and type shall be interchangeable.
- D. Manually operated gate, globe and angle valves shall be of rising stem type, unless otherwise specified.
- E. Valves which use packing, shall be capable of being packed when wide open and under full working pressure.
- F. Size valves the same size as the piping in which they are installed, unless specified otherwise.

2.02 CHECK VALVES

- A. Type S: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 37, Hammond IB940, Jenkins 4092, Milwaukee 509, Nibco T413Y, and Stockham B319Y.

- B. Type U: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and solder ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 1340, Hammond IB912, Jenkins 4093, Milwaukee 1509, Nibco S413Y, and Stockham 309Y.
- C. Type V: 125 psig WSP, 200 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 372, & 373, Hammond IR1124, Jenkins 623CJ & 624CJ, Milwaukee F2974, Nibco F918, and Stockham G927 & G931.
- D. Type W:
 - 1. Globe Style Silent Check Valve: IBBM or semi-steel with bronze mounting, renewable seat and disc, 18-8 stainless steel spring, and flanged ends.
 - a. Acceptable Valves (125 psig flange pressure rating): Apco Series 600, Combination Pump & Valve 20D, Hammond IR9354, Milwaukee 1800, Nibco F910, and Williams Hager 636.
 - b. Acceptable Valves (250 psig flange pressure rating): Apco Series 600, Combination Pump & Valve 21D, Milwaukee 1800, Nibco F960, and Williams Hager 636.
 - 2. Wafer Style Silent Check Valve: IBBM or semi-steel with bronze mounting, renewable seat and disc, 18-8 stainless steel spring, and flanged ends.
 - a. Acceptable Valves (125 psig flange pressure rating): Apco Series 300, Combination Pump and Valve 10D, Hammond IR9253, Milwaukee 1400, Nibco W910, and Williams Hager 329 & 375.
 - b. Acceptable Valves (250 psig flange pressure rating): Apco Series 300, Combination Pump and Valve 11D, Milwaukee 1400, Nibco W960, and Williams Hager 329 & 375.

2.03 BALL VALVES

- A. Type BV: 150 psig WSP, 600 psig WOG, 2 piece bronze body, solid blow-out proof stem, teflon seats, chrome plated brass ball, teflon seals, corrosion resistant steel lever handles with vinyl grips, balancing stop, and threaded or solder ends. Acceptable Manufacturers: Conbraco, Hammond, Milwaukee, Nibco, and Watts.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Install valves at locations noted on the drawings or specified.

3.02 VALVE APPLICATION SCHEDULE

- A. Schedule of valve applications for the different services is as follows:
 - 1. Cold Water In Buildings and Tunnels (CW) 125 psig and Less:
 - a. 3 inch and Less: A or D gates or BV balls, O globes or angles, and S or U checks; or C gates, K globes or angles, and V checks, with solder joint companion flanges.
 - b. 4 inch and Up: C gates or BF butterflies, K globes or angles, and V checks.
 - 2. Compressed Air (A) 125 psig and less:
 - a. 2 inches and Less: A gates, J globe or angles, and W checks.
 - b. 2-1/2 inches and Up: C gates, K globe or angles, and W checks.
 - 3. Domestic Hot Water and Circulating (DHW & DHWC) 125 psig and Less:
 - a. 3 inch and Less: A or D gates or BV balls, J or O globes or angles, and S or U checks.
 - b. 4 inch and Up: C gates or BF butterflies, K globes or angles, and V checks.
 - 4. Gas - Natural, Manufactured or Mixed Fuel (G) 125 psig and Less:

- a. 2 inch and Less: AB plug valves.
- b. 2-1/2 inch and Up: AA plug valves.
- 5. Gas, Bottled Liquified Petroleum (BG): A gates, and J globes or angles, with flared or ferrule copper tubing adapters.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General support requirements for plumbing piping
- B. Support requirements for cast iron piping
- C. Pipe support requirements for cast-in-place concrete construction
- D. Pipe support requirements for steel/concrete construction
- E. Pipe support requirements for wood construction
- F. Pipe hangers and supports
- G. Anchors and attachments
- H. Fasteners
- I. Shop painting and plating

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Companion high density filler pieces for installation over the top 180 degree surface of pipe or tubing, at points of support where a combination clevis hanger, insulation shield and high density insulating saddle are installed.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Piping Insulation: Section 220700.

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.
 - 2. Details of pipe anchors.
 - 3. Details and method of installing sway braces for cast iron soil pipe.
- B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with the applicable requirements of the ASME B31 Piping Codes.
 - 2. Unless otherwise shown or specified, comply with the requirements of the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58, and SP-69.
 - 3. Hang and support cast iron soil pipe and fittings in accordance with the recommendations of the Cast Iron Soil Pipe's Institute's (CISPI) Cast Iron Soil Pipe and Fittings Handbook.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.
1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
Up to 2-1/2	4	16	6	10
3 to 6	4	14	6	10
8 to 14	10	12	12	16
16 and up	10	10	12	16

- B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18
3 to 8	10	16
10 to 14	12	12
16 and up	18	10

- C. Pipe Covering Protection Saddles: 3/16 inch thick steel, of sufficient depth for the insulation thickness specified, notched so that saddle contact with the pipe is approximately 50 percent of the total axial cross section. Saddles for pipe 12 inches in size and larger shall have a center support.
- D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.
1. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches in size and larger.
- E. Adjustable Floor Rests and Base Flanges: Steel.
- F. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.
- G. Riser Clamps: Malleable iron or steel.
- H. Rollers: Cast Iron.

2.02 ANCHORS AND ATTACHMENTS

- A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN, HN, or FS Series.
- B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS Series.
- C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips S Series.
- D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.
- E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS Series.
- F. Beam Clamps: Forged steel beam clamp, with weldless eye nut (right hand thread), steel tie rod, nuts, and washers, Grinnell's Fig No. 292 (size for load, beam flange width, and rod size required).
- G. Metal Deck Ceiling Bolts: B-Line Systems' Fig. B3019.
- H. Continuous Slotted Type Concrete Insert, Galvanized:
 - 1. Load Rating 800 lbs/ft: Kindorf's D-986.
 - 2. Load Rating 1500 lbs/ft: Kindorf's D-980.
 - 3. Load Rating 3000 lbs/ft: Hohmann & Barnard's Inc. Type CS-H.
 - 4. Load Rating 4500 lbs/ft: Hohmann & Barnard's Inc. Type CS-HD.
- I. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded to receive 3/4 inch diameter machine bolts.
- J. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept 3/4 inch diameter bolts having special wedge shaped heads.

2.03 FASTENERS

- A. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.04 SHOP PAINTING AND PLATING

- A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with metal primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper pipe or copper tubing.
- B. Hanger supports for chromium plated pipe shall be chromium plated brass.

PART 3 EXECUTION

3.01 PREPARATORY WORK

- A. Place inserts into construction form work expeditiously, so as not to delay the Work.

3.02 INSTALLATION

- A. Do not hang or support one pipe from another or from ductwork.
 - 1. Do not bend threaded rod.
- B. Support all insulated horizontal piping conveying fluids below ambient temperature, by means of hangers or supports with insulation shields installed outside of the insulation.
- C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.
 - 1. For Steel, and Threaded Brass Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10
2-1/2 and up	12

- 1. For Grooved End Steel Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	7
2 through 4	10
5 and over	12

- 1. No pipe length shall be left unsupported between any two coupling joints.
- 2. For Copper Pipe and Copper Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	6
2 and over	10

- 1. For Glass Pipe, and Aluminum Tubing:

TYPE	3/4 INCH AND UNDER	1 INCH AND 1-1/4 INCH	1-1/2 INCH AND OVER
	(Maximum Spacing In Feet)		
Glass Pipe	8	8	8
Plastic Tubing	3	5	7
Aluminum Tubing	3	5	7

- 1. For Plastic Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
Under 2 inch	3

2 inch and over	4

1. Cast Iron Soil Pipe:
 - a. General:
 - 1) Where piping is suspended on centers in excess of 18 inches by means of non-rigid hangers, provide sway bracing to prevent horizontal pipe movement.
 - 2) Additionally, brace piping 5 inches and larger to prevent horizontal movement and/or joint separation. Provide braces, blocks, rodding or other suitable method at each branch opening, or change of direction
 - b. For Bell & Spigot Cast Iron Soil Pipe: Space hangers or support pipe at each joint or on maximum centers of 5 feet. Place hangers or supports as close as possible to joints and when hangers or supports do not come within 1 foot of a branch line fitting, install an additional hanger or support at the fitting.
 - c. For Hubless Cast Iron Soil Pipe: Space hangers or support pipe at each joint or on maximum centers of 5 feet. Place hanger or supports as close as possible to joints and when hangers or supports do not come within 1 foot of a branch line fitting, install an additional hanger or support at the fitting.
2. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.
3. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.
4. For Branch Piping Runs and Runouts Over 5 feet In Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
5. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.
6. Support floor drain traps from the overhead construction, with hangers of type and design as required and approved. Overhead supports are not required for floor drain traps installed directly below earth supported concrete floors.

D. Size hanger rods in accordance with the following:

PIPE OR TUBING SIZE (Inches)	SINGLE ROD HANGER SIZE (Inches)		DOUBLE ROD HANGER SIZE (Inches)	
	PIPE	TUBING	PIPE	TUBING
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	1/2	3/8	3/8	1/4
4 and 5	5/8	1/2	1/2	3/8
6	3/4	1/2	5/8	1/2
8, 10 and 12	7/8	5/8	3/4	5/8

1. Size hanger rods, for piping over 12 inches in size and multiple line supports, based on a safety factor of five for the ultimate strength of the materials being used.
2. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger

attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.

E. Vertical Piping:

1. Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 25 feet, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.
2. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.
3. Support cast iron risers, by means of heavy duty hangers installed close to the base of the pipe risers, and 1/4 inch thick malleable iron or steel riser clamps with extension arms at each floor level, with the distance between clamps not to exceed 25 feet. Support cast iron risers in vertical shafts equivalent to the aforementioned.
4. Support hubless cast iron risers, by means of heavy duty hangers installed close to the base of the pipe risers, and by malleable iron or steel riser clamps with the extension arms at each floor level, with the distance between clamps or intermediate supports not to exceed 12 feet. Support risers in vertical shafts equivalent to the aforementioned.

F. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not be detrimental to the building structure.

G. Underground Pipe Supports: Firmly bed pipe laid underground, on solid ground along bottom of pipe. Install masonry piers for pipe laid in disturbed or excavated soil or where suitable bearing cannot be obtained. Support pipe, laid proximate to building walls in disturbed or excavated soil, or where suitable bearing cannot be obtained, by means of wall brackets or hold-fasts secured to walls in an approved manner.

3.03 UPPER HANGER ATTACHMENTS

A. General:

1. Secure upper hanger attachments to overhead structural steel, steel bar joists, or other suitable structural members.
2. Do not attach hangers to steel decks that are not to receive concrete fill.
3. Do not attach hangers to precast concrete plank decks less than 2-3/4 inches thick.
4. Do not use flat bars or bent rods as upper hanger attachments.

B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.

1. Do not use drive-on beam clamps.
2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.
3. Do not drill holes in main structural steel members.
4. Beam clamps, with tie rods as specified, may be used as upper hanger attachments for the support of piping, subject to clamp manufacturer's recommended limits.

C. Attachment to Concrete Filled Steel Decks:

1. New Construction: Install metal deck ceiling bolts.
2. Existing Construction: Install welding studs (except at roof decks). Do not support a load in excess of 250 lbs from any single welded stud.

3. Do not attach hangers to decks less than 2-1/2 inches thick.
- D. Attachment to Cast-In-Place Concrete: Secure to overhead construction by means of cast-in-place concrete inserts.
- E. Attachment to Existing Cast-In-Place Concrete:
 1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.
 2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.
- F. Attachment to Cored Precast Concrete Decks (Flexicore, Dox Plank, Spancrete, etc.): Toggle bolts may be installed in cells for the support of piping up to a maximum of 2-1/2 inches in size.
- G. Attachment to Hollow Block or Hollow Tile Filled Concrete Decks:
 1. New Construction: Omit block or tile and pour solid concrete with cast-in-place inserts.
 2. Existing Construction: Break out block or tile to access, and install machine bolt anchors at highest practical point on side of web.
- H. Attachment to Waffle Type Concrete Decks:
 1. New Construction: Install cast-in-place inserts.
 2. Existing Construction: Install machine bolt expansion anchors at highest practical point on side of web.
- I. Attachment to Precast Concrete Tee Construction:
 1. New Construction: Tee hanger inserts between adjacent flanges, except at roof deck without concrete fill.
 2. Existing Construction: Dual unit expansion shields in webs of tees. Install shields as high as possible in the webs.
 - a. Exercise extreme care in the field drilling of holes to avoid damage to reinforcing.
 - b. Do not use powder driven fasteners.
- J. Attachment to Wood Construction: Secure hangers to the sides (only) of wood members, by means of malleable iron side beam connectors, or malleable iron or steel side beam brackets. Do not secure hanger attachments to nailing strips resting on top of steel beams.
 1. Secure side beam connectors to wood members with two No. 18 x 1-1/2 inch long wood screws, or two No. 16 x 1-1/2 inch long drive screws. Do not support piping over 1-1/2 inches in size from side beam connectors. Do not hammer in wood screws.
 2. Secure side beam brackets to wood members with steel bolts or lag screws. Do not use lag screws in wooden members having a nominal thickness (beam face) under 2 inches in size. Install bolts or lag screws, in the sides of a timber or a joist, at the mid-point or above, not less than 2-1/2 inches from the lower edge when supporting branch lines and not less than 3 inches from the lower edge when supporting mains. Install heavy gage steel washers under all nuts.
 3. Secure side beam brackets to wooden beams or joists, with lag screws or bolts of size as follows:

PIPE SIZE (Inches)	LAG SCREW SIZE (Inches)	BOLT DIAMETER (Inches)
2 and under	3/8 diameter x 1-3/4	3/8
2-1/2 and 3	1/2 diameter x 2	1/2
4 and 5	Use Bolt	5/8

1. Do not support piping larger than 3 inches with lag screws. Pre-drill holes for lag screws 1/8 inch in diameter less than the root diameter of the lag screw thread.

2. The minimum width of the lower face of wood beams or joints in which lag screws of size as specified may be used is as follows:

LAG SCREW DIAMETER (Inches)	NOMINAL WIDTH OF BEAM FACE (Inches)
3/8	2
1/2	3

1. Do not secure hanger attachment to the diagonals or vertical members of the trusses.

3.04 ANCHORS, RESTRAINTS, RIGID SUPPORTS, STAYS AND SWAY BRACES

- A. Cast Iron Soil Piping Systems:
 1. Where piping is suspended on centers in excess of 18 inches by means of non-rigid hangers, provide sway braces, of design, number and location in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.
 2. Additionally, brace piping 5 inches and larger to prevent horizontal movement and/or joint separation. Provide braces, blocks, rodding or other suitable method at each branch opening, or change of direction in accordance with the Cast Iron Soil Pipe Institute's Cast Iron Soil Pipe and Fittings Handbook to prevent horizontal pipe movement.

3.05 PIPING IN TUNNELS

- A. Support piping in tunnels on adjustable stanchions, fabricated in accordance with the details on the Drawings, unless otherwise indicated. Install, secure and be responsible for the proper locations of all cast-in-place inserts and stanchion supports, in ample time so as not to delay construction Work. Secure tops of stanchions to overhead construction, as required and approved.

3.06 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

- A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold service. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.07 PIPE INSULATION SHIELDS

- A. Unless otherwise specified, install a pipe insulation shield, at all points of support. Center shields on all hangers and supports outside of high density insulation insert, and install in such a manner so as not to cut, or puncture jacket.

3.08 PIPE COVERING PROTECTION SADDLES

- A. Install pipe covering protection saddles at all points of support, for steel piping 6 inches in size and larger, insulated with hot service insulation. Weld saddles to piping to insure movement with pipe.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe markers and accessories

1.02 REFERENCES

- A. ANSI A13.1 - Scheme for Identification of Piping Systems.

1.03 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions for each item specified.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. W.H. Brady Co., Milwaukee, WI.
- B. Emed Co., Buffalo, NY.
- C. Panduit Corp., Tinley Park, IL.
- D. Seton Nameplate Corp., New Haven, CT.

2.02 PIPE MARKERS AND ACCESSORIES

- A. Snap-on Marker: One piece wrap around type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4 inch adhesive strip on inside edge, and 360 degree visibility.
- B. Strap-On Marker: Strip type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.
- C. Stick-On Marker: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.
- D. Pipe Marker Legend and Color Field Sizes:

OUTSIDE DIAMETER OF PIPE OR INSULATION (Inches)	LETTER SIZE (Inches)	LENGTH OF COLOR FIELD (Inches)
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1-1/4	12
8 to 10	2-1/2	24
Over 10	3-1/2	32

- E. Banding Tapes: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.
 - 1. Plain Tape: Unprinted type; color to match pipe marker background.
 - 2. Flow Arrow Tape: Printed type with integral flow arrows; color to match pipe marker background.
- F. Pipe Size Labels: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, vertical reading pipe size in inches, and legend size matching adjacent pipe marker.

PART 3 EXECUTION

3.01 PREPARATION

- A. Complete testing, insulation and finish painting work prior to completing the Work of this Section.
- B. Clean pipe surfaces with cleaning solvents prior to installing piping identification.
- C. Remove dust from insulation surfaces with clean cloths prior to installing piping identification.

3.02 INSTALLATION

- A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.
- B. Stick-On Pipe Markers:
 - 1. Install minimum of 2 markers at each specified location, 90 degrees apart on visible side of pipe.
 - 2. Encircle ends of pipe markers around pipe or insulation with banding tape with one inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.
- C. Pipe Size Labels: Install labels adjacent to each pipe marker and upstream from flow arrow. Install a minimum of 2 pipe size labels at each specified location, 90 degrees apart on visible side of pipe.
- D. Pipe Service Identification Tags: Attach tags to piping being identified with "S" hooks or jack chains.

3.03 PIPING IDENTIFICATION SCHEDULE

- A. Piping Identification Types:
 - 1. Piping or Insulation under 3/4 inch od: Pipe identification tags.
 - 2. Piping or Insulation 3/4 inch to 5-7/8 inch od: Snap-on marker or stick-on marker.
 - 3. Piping or Insulation 6 inch od and Larger: Strap-on marker or stick-on marker.
- B. Identify exposed piping, bare or insulated, as to content, size of pipe and direction of flow, with the following exceptions:
 - 1. Piping in non-walk-in tunnels or underground conduits between manholes.
 - 2. Piping in furred spaces or suspended ceilings, except at valve access panels where valves and piping shall be identified as specified for exposed piping systems.
 - 3. Piping in finished spaces such as offices, class rooms, wards, toilet rooms, shower rooms and spaces as specified.

- C. Locate piping identification to be visible from exposed points of observation.
 - 1. Locate piping identification at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs.
 - 2. Where 2 or more pipes run in parallel, place printed legend and other markers in same relative location.

3.04 VALVE IDENTIFICATION SCHEDULE

- A. Valve Service Identification Tags:
 - 1. Tag control valves, except valves at equipment, with a brass tag fastened to the valve handle or stem, marked to indicate service and numbered in sequence for the following applications:
 - a. Domestic water valves controlling mains, risers and branch runouts.
 - b. Gas valves controlling mains, risers, and branch runouts.
 - c. Valves in sprinkler and fire standpipe systems, except hose valves.
- B. Valve Service Identification Charts:
 - 1. Provide 2 framed valve charts for each piping system specified to be provided with valve identification tags. Type charts on 8-1/2 x 11 inches heavy white bond paper, indicating valve number, service and location.
 - 2. Hang framed charts at locations as directed.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cleanout plug
- B. Cleanout
- C. Cleanout deck plate
- D. Air gap fitting
- E. Indirect waste funnel
- F. Fasteners

1.02 REFERENCES

- A. Comply with the applicable requirements of ASME A112.36.2M - Cleanouts, and ASME A112.1.2 - Drainage Funnels and Air Gaps.

1.03 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for each item specified except fasteners.

1.04 MAINTENANCE

- A. Special Tools: Deliver the following to the Owner's Representative:
 - 1. Tools for Vandal Resistant Fasteners: One for each type and size.
 - 2. T-Handle Wrench for Cleanout Plugs: One for each type and size.

PART 2 PRODUCTS

2.01 CLEANOUT PLUG

- A. Cast brass or bronze, with threaded end, and raised or countersunk head.
 - 1. Tapped head for attachment of cleanout wall or deck plate covers where required.
- B. Anti-Seize Lubricant: Never-Seez by Bostik Chemical Group, Broadview, IL; Molycote 1000 by Dow Corning Corp, Midland, MI; Anti-Seize Lubricant by Loctite Corp, Newington, CT.

2.02 CLEANOUT

- A. Threaded pipe fitting or cast iron ferrule with gas tight cleanout plug.

2.03 CLEANOUT DECK PLATE

- A. Standard duty floor cleanout fitting with coated cast iron body; round, polished nickel bronze scoriated top secured to cleanout plug with stainless steel vandal resistant fastener; threaded height adjustment, cast iron head, gas tight cleanout plug, and connection to match piping option selected.
- B. Membrane flange and clamping collar, secured with corrosion resistant fasteners.

2.04 AIR GAP FITTING

- A. Coated cast iron body with air gaps, set screw or threaded inlet, and outlet connection to match piping option selected.

2.05 INDIRECT WASTE FUNNEL

- A. Combination Funnel Drain and P Trap: Polished chrome plated cast brass construction.
 - 1. Funnel: 4 inch top dia., 4 inches deep, with threaded outlet.
 - 2. P Trap: Bottom cleanout, threaded inlet, and outlet connection to match piping option selected.

2.06 FASTENERS

- A. Corrosion Resistant Fasteners: Brass, bronze, or Type 302 or 304 stainless steel bolts.
- B. Vandal Resistant Fasteners: Torx head with center pin.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.
- B. Cleanout Plug: Lubricate threads with anti-seize lubricant before final installation.
- C. Grease Trap: Set flow control as recommended by the manufacturer's instructions.
- D. Secure external components in place with vandal resistant fasteners or devices which cannot be removed without special tools.

END OF SECTION

SECTION 220577 - FLOOR AND AREA DRAINS **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Floor drain for installation in concrete flooring
- B. Floor drain for installation in wood flooring
- C. Floor sink
- D. Fasteners

1.02 REFERENCES

- A. Unless otherwise specified, the Work of this section shall meet the applicable requirements of FS WW-P-541 - Plumbing Fixtures, and ASME A112.21.1M - Floor Drains.

1.03 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions for each type drain specified.

1.04 MAINTENANCE

- A. Special Tools: Deliver to the Building Owner.
- B. Tools for Vandal Resistant Fasteners: One for each type and size.

PART 2 PRODUCTS

2.01 FLOOR DRAIN – CONCRETE FLOORING

- A. Drain Body: Coated cast iron, two-piece body with reversible flashing clamp, minimum 9 inch dia drainage flange, corrosion resistant bolts, weep holes, bottom outlet, and connection to match piping option selected.
- B. Strainer Head: Round, minimum 7 inch dia, nickel bronze with threaded shank for height adjustment.
- C. Strainer Grate: Polished nickel bronze, heel proof; secured with stainless steel vandal resistant fasteners.
- D. Acceptable Drain Series: Josam 30000A, Smith 2010A, Wade W1100, and Zurn Z415.

2.02 FLOOR DRAIN – WOOD FLOORING

- A. Drain Body: Coated cast iron, two-piece body with flashing clamp, minimum 8 inch dia drainage flange, corrosion resistant bolts, weep holes, bottom outlet, and connection to match piping option selected.
- B. Strainer Head: Round, minimum 5 inch dia, nickel bronze with threaded shank for height adjustment.
- C. Strainer Grate: Polished nickel bronze, heel proof, fitted with a 4 inch high, 4 inch dia nickel bronze funnel, and secured with stainless steel vandal resistant fasteners.
- D. Acceptable Drain Series: Watts FD9, Mifab F1230, Zurn FD2

2.03 FLOOR SINK

- A. Drain Body: 12"x12" coated cast iron, 6" receptor with recessed dome strainer and grating. Interior body to be coated with white acid resistant porcelain enamel.
- B. Strainer Dome: ABS anti-splash interior dome strainer
- C. Strainer Grate: Light Duty Cast Iron acid resistant coating with 1/2" slotted opening.
 - 1. 3/4 grate for (1) pipe discharge
 - 2. 1/2 grate for (2-3) pipe discharges
 - 3. No grate for more than 3 pipe discharges
 - 4. Acceptable Drain Series: Watts FS-710, Sioux Chief 861, Mifab FS1520, and Zurn Z1900.

2.04 FASTENERS

- A. Corrosion Resistant Fasteners: Brass, bronze, or Type 302 or 304 or stainless steel bolts.
- B. Vandal Resistant Fasteners: Torx head with center pin.

2.05 FREE AREA OF GRATE

- A. Minimum strainer grate free area listed below for each connecting pipe size:

CONNECTING PIPE SIZE (Inches Nominal)	INTERIOR DRAINS FREE AREA (Square Inches)	EXTERIOR DRAINS FREE AREA (Square Inches)
1-1/2	3.06	4.08
2	4.71	6.28
3	10.59	14.12
4	18.90	25.20
5	29.40	39.20
6	42.45	56.60
8	75.38	100.50

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.
- B. Protect weep holes from plugging during installation. Rod out weep holes after installation to remove obstructions.
- C. Set drainage flange flush with top of structural floor slab, or at elevation otherwise indicated.
- D. After membrane waterproofing installed and cured, secure clamping ring.

SECTION 220577 - FLOOR AND AREA DRAINS **H2M**

- E. Adjust strainer head to height indicated. If height not indicated, set at 1/2 inch below finished floor elevation.
- F. Secure external components in place with vandal resistant fasteners or devices which cannot be removed without special tools.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation
- B. Insulation jackets
- C. Adhesives, mastics, and sealers
- D. Miscellaneous materials

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Through Penetration Firestops: Section 078400.
- B. Painting: Section 099103.
- C. Pipe Hangers and Supports: Section 220529.

1.03 ABBREVIATIONS

- A. FS: Federal Specification.
- B. K: Thermal Conductivity, i.e., maximum Btu per inch thickness per hour per square foot.
- C. pcf: Pounds per cubic foot.
- D. PVC: Polyvinylchloride.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the following:
 - 1. Insulation Materials.
 - 2. Jacket Materials.
- B. Quality Control Submittals:
 - 1. Installers Qualification Data:
 - a. Name of each person who will be performing the Work, and their employer's name, business address and telephone number.
 - b. Furnish names and addresses of the required number of similar projects that each person has worked on which meet the qualifications.

1.05 QUALITY ASSURANCE

- A. Qualifications: The persons installing the Work of this Section and their Supervisor shall be personally experienced in mechanical insulation work and shall have been regularly employed by a company installing mechanical insulation for a minimum of 5 years.
- B. Regulatory Requirements:
 - 1. Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

PART 2 PRODUCTS

2.01 PIPING INSULATION

- A. Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
 - 1. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM C 547:
 - a. Class 1 (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
 - 2. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.
 - 3. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.
 - a. Suitable for temperatures up to 450 degrees F.
- B. Flexible Elastomeric Foam Insulation:
 - 1. FM tested and approved, meeting the following:
 - a. Maximum Water Vapor Transmission: 0.10 perm - inch based on ASTM E 96, Procedure A.
 - b. K of 0.27 at 75 degrees F based on ASTM C 518 or C 177.
 - c. Fire Spread/Smoke Developed Rating: 25/50 or less based on ASTM E 84.
 - 2. Pipe Insulation: ASTM C 534, Type I.
 - 3. Polyethylene and polyolefin insulation is not acceptable.
- C. High Density Jacketed Insulation Inserts for Hangers and Supports:
 - 1. For Use with Fibrous Glass Insulation:
 - a. Cold Service Piping:
 - 1) Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
 - b. Hot Service Piping:
 - 1) Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
 - 2) Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.
 - 2. For Use with Flexible Elastomeric Foam Insulation: Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.
- D. Cements:
 - 1. Fibrous Glass Thermal Insulating Cement: Asbestos free; ASTM C 195.
 - 2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement: ASTM C 449/C 449M.

2.02 INSULATION JACKETS

- A. Laminated Vapor Barrier Jackets for Piping: Factory applied by insulation manufacturer, conforming to ASTM C 1136, Type I.
 - 1. Type I: Reinforced white kraft and aluminum foil laminate with kraft facing out.
 - a. Pipe Jackets: Furnished with integral 1-1/2 inch self sealing longitudinal lap, and separate 3 inch wide adhesive backed butt strips.
 - 2. Laminated vapor barrier jackets are not required for flexible elastomeric foam insulation.
- B. Canvas Jackets: Cotton duck, fire retardant, complying with NFPA 701, 4 oz or 6 oz per sq yd as specified.
- C. Premolded PVC Fitting Jackets:
 - 1. Constructed of high impact, UV resistant PVC.

- a. ASTM D 1784, Class 14253-C.
 - b. Working Temperature: 0-150 degrees F.
- D. Under Lavatory Piping Protection Cover: ADA compliant.
- 1. Construction: 1/8 inch thick chemical, microbial, and fungal resistant, injection molded smooth PVC vinyl with internal ribs.
 - 2. Fasteners: Reusable, finger press internal fasteners presenting no sharp or abrasive external surfaces.
 - 3. Cover Trimming: Tear on internal, dimensioned tear lines for proper fit.
 - 4. Kit includes covering for 8 inch tailpiece-trap, 8 inch waste arm, hot and cold water supplies and valves, and required fasteners.
 - 5. Acceptable Covers:
 - a. Lav Guard 2, E-Z Series by IPS Corp., 202 Industrial Park Lane, Collierville, TN 38017, (800) 340-5969, www.truebro.com.
 - b. Pro-Extreme Series by Plumberex, P.O. Box 1684, Palm Springs, CA 92263, (800) 475-8629, www.plumberex.com.

2.03 ADHESIVES, MASTICS, AND SEALERS

- A. Lagging Adhesive (Canvas Jackets): Childers' CP-50AMV1, Epolux's Cadalag 336, Foster's 30-36.
- B. Vapor Lap Seal Adhesive (Fibrous Glass Insulation): Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-60 or 85-20.
- C. Vapor Barrier Mastic(Fibrous Glass Insulation): Permeance shall be .03 perms or less at 45 mils dry per ASTM E 96. Childers' CP-34, Epolux's Cadalar 670, Foster's 30-65.
- D. Adhesive (Flexible Elastomeric Foam): Armstrong's 520, Childers' CP-82, Epolux's Cadoprene 488, Foster's 85-75. 5 gallon cans only
- E. Adhesive (Fiberglass Duct Liner): Childers' Chil Quick CP-127, Foster Vapor Fas 85-60. Must comply with ASTM C 916, Type II
- F. Weather Barrier Breather Mastic (Reinforcing Membrane): Childers' VI-CRYL CP-10/11, Foster's Weatherite 46-50.
- G. Sealant (Metal Pipe Jacket): Non hardening elastomeric sealants. Foster Elastolar 95-44, Childers Chil Byl CP-76, Pittsburgh Corning 727
- H. Reinforcing Membrane: Childers' Chil Glas #10, Foster Mast a Fab, Pittsburgh Corning PC 79

2.04 MISCELLANEOUS MATERIALS

- A. Pressure Sensitive Tape for Sealing Laminated Jackets:
 - 1. Acceptable Manufacturers: Alpha Associates, Ideal Tape, Morgan Adhesive.
 - 2. Type: Same construction as jacket.
- B. Wire, Bands, and Wire Mesh:
 - 1. Binding and Lacing Wire: Nickel copper alloy or copper clad steel, gage as specified.
 - 2. Bands: Galvanized steel, 1/2 inch wide x 0.015 inch thick, with 0.032 inch thick galvanized wing seals.
 - 3. Wire Mesh: Woven 20 gage steel wire with 1 inch hexagonal openings, galvanized after weaving.

- C. Reinforcing Membrane: Glass or Polyester, 10 x 10 mesh. Alpha Associates Style 59, Childer's Chil-Glas, Foster's MAST-A-FAB.

PART 3 EXECUTION

3.01 PREPARATION

- A. Perform the following before starting insulation Work:
1. Install hangers, supports and appurtenances in their permanent locations.
 2. Complete testing of piping.
 3. Clean and dry surfaces to be insulated.

3.02 INSTALLATION, GENERAL

- A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.
- B. Provide continuous piping insulation and jacketing when passing thru interior wall, floor, and ceiling construction.
1. At Through Penetration Firestops: Coordinate insulation densities with the requirements of approved firestop system being installed. See Section 078400.
 - a. Insulation densities required by approved firestop system may vary with the densities specified in this Section. When this occurs use the higher density insulation.
- C. Do not intermix different insulation materials on individual runs of piping.
- D. All water, soil, and waste piping exposed to freezing temperatures shall be protected from freezing by insulation, heat, or both. This included piping in unheated garages, building overhangs, and exposed storm piping.

3.03 INSTALLATION AT HANGERS AND SUPPORTS

- A. Reset and realign hangers and supports if they are displaced while installing insulation.
- B. Install high density jacketed insulation inserts at hangers and supports for insulated piping.
- C. Insulation Inserts For Use with Fibrous Glass Insulation:
1. Where clevis hangers are used, install insulation shields and high density jacketed insulation inserts between shield and pipe.
 - a. Where insulation is subject to compression at points over 180 degrees apart, e.g. riser clamps, U-bolts, trapezes, etc.; fully encircle pipe with 2 protection shields and 2 high density jacketed fibrous glass insulation inserts within supporting members.
 - 1) Exception: Locations where pipe covering protection saddles are specified for hot service piping, 6 inch and larger.
- D. Insulation Inserts For Use with Flexible Elastomeric Foam Insulation:
1. Where clevis hangers are used, install insulation shields with hardwood filler pieces, same thickness as adjoining insulation, inserted in undersized die cut or slotted holes in insulation at support points.
 2. Contour hardwood blocks to match the curvature of pipe, and shield.
 3. Coat dowels and blocks with insulation adhesive, and insert while still wet.
 4. Vapor seal outer surfaces of dowels and blocks with adhesive after insertion.
 5. Install filler pieces as follows:

PIPE/TUBING SIZE	FILLER PIECES	POSITION
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Thru 1-1/2"	2 dowel plugs	6 o'clock; in tandem
2" thru 4"	1 block, 2 dowel plugs	6 o'clock, and 4 & 8 o'clock respectively
6" thru 8"	2 blocks, 4 dowel plugs	6 o'clock; in tandem and 4 & 8 o'clock; in tandem

3.04 INSTALLATION OF FIBROUS GLASS COLD SERVICE INSULATION

- A. Install insulation materials with a field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket, unless otherwise specified.
- B. Piping:
 - 1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide butt adhesive backed strips.
 - a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as jacket, may be used in lieu of butt strips.
 - 2. Bed insulation in a 2-inch wide band of vapor barrier mastic, and vapor seal exposed ends of insulation with vapor barrier mastic at each butt joint between pipe insulation and equipment, fittings or flanges at the following intervals:
 - a. Horizontal Pipe Runs: 21 ft.
 - b. Vertical Pipe Runs: 9 ft.
- C. Fittings, Valves, Flanges and Irregular Surfaces:
 - 1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as pipe insulation.
 - 2. Secure insulation in place with 16-gage wire, with ends twisted and turned down into insulation.
 - 3. Butt insulation against pipe insulation and bond with joint sealer.
 - 4. Insulate valves up to and including bonnets, without interfering with packing nuts.
 - 5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
 - 6. When insulating cement has dried, seal fitting, valve and flange insulation, by imbedding a layer of reinforcing membrane or 4 oz. canvas jacket between 2 flood coats of vapor barrier mastic, each 1/8 inch thick wet.
 - 7. Lap reinforcing membrane or canvas on itself and adjoining pipe insulation at least 2 inches.
 - 8. Trowel, brush or rubber glove outside coat over entire insulated surface.
 - 9. Exceptions:
 - a. Type C and D Piping Systems: Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.
 - 1) Additional insulation inserts are required for services with operating temperatures under 45 degrees F or where insulation thickness exceeds 1-1/2 inches. The surface temperature of PVC fitting jacket must not go below 45 degrees F.

3.05 INSTALLATION OF FIBROUS GLASS HOT SERVICE INSULATION

- A. Install insulation materials with field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket unless otherwise specified.
- B. Canvas Jackets on Piping, Fittings, Valves, Flanges, Unions, and Irregular Surfaces:
 - 1. For Piping 2 inch Size and Smaller: 4 oz per sq yd unless otherwise specified.
 - 2. For Piping Over 2 inch Size: 6 oz per sq yd unless otherwise specified.

- C. Piping:
1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide adhesive backed butt strips.
 - a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as the jacket, may be used in lieu of butt strips.
 2. Fill voids in insulation at hanger with insulating cement.
 3. Exceptions:
 - a. Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Spaces and Concealed Piping: Butt insulation joints together and secure minimum 1-1/2 inch wide longitudinal jacket laps and 3 inch wide butt strips of same material as jacket, with outward clinching staples on maximum 4 inch centers. Fill voids in insulation at hangers with insulating cement.
- D. Fittings, Valves, Flanges and Irregular Surfaces:
1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as insulation.
 2. Secure in place with 16-gage wire, with ends twisted and turned down into insulation.
 3. Butt fitting, valve and flange insulation against pipe insulation, and fill voids with insulating cement.
 4. Insulate valves up to and including bonnets, without interfering with packing nuts.
 5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
 6. After insulating cement has dried, coat insulated surface with lagging adhesive, and apply 4 oz or 6 oz canvas jacket as required by pipe size.
 - a. Lap canvas jacket on itself and adjoining pipe insulation at least 2 inches.
 - b. Size entire canvas jacket with lagging adhesive.
 7. Exceptions:
 - a. In Types E, and F Service Piping Systems: Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.
 - 1) Additional insulation inserts are required for services with operating temperatures over 250 degrees F or where insulation thickness exceeds 1-1/2 inches. The surface temperature of PVC fitting jacket must not exceed 150 degrees F.
 - b. In Types E, and F Service Piping Systems: Insulate fittings, valves, and irregular surfaces 3 inch size and smaller with insulating cement covered with 4 oz or 6 oz canvas jacket as required by pipe size.
 - 1) Terminate pipe insulation adjacent to flanges and unions with insulating cement, trowelled down to pipe on a bevel.
 - c. Fittings, Valves, Flanges, and Irregular Surfaces In Concealed Piping, Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Rooms, Unfinished Spaces, and Tunnels: Sizing of canvas surface is not required.

3.06 INSTALLATION OF FLEXIBLE ELASTOMERIC FOAM INSULATION

- A. Where possible, slip insulation over the pipe, and seal butt joints with adhesive.
1. Where the slip-on technique is not possible, slit the insulation and install.
 2. Re-seal with adhesive, making sure the mating surfaces are completely joined.
- B. Insulate fittings and valves with miter cut sections. Use templates provided by the manufacturer, and assemble the cut sections in accordance with the manufacturer's printed instructions.
1. Insulate threaded fittings and valves with sleeved fitting covers. Over lap and seal the covers to the adjoining pipe insulation with adhesive.

- C. Carefully mate and seal with adhesive all contact surfaces to maintain the integrity of the vapor barrier of the system.
- D. Piping Exposed Exterior to a Building, Totally Exposed to the Elements:
 - 1. Apply flexible elastomeric foam insulation to piping with adhesive.
 - 2. Apply reinforcing membrane around piping insulation with adhesive or mastic.
 - 3. Adhesive Applied System: Apply 2 coats of finish. See Section 099103.
 - 4. Mastic Applied System: Apply another coat of mastic over reinforcing membrane.

3.07 INSTALLATION OF SHEET METAL JACKETING ON PIPING

- A. Secure jacketing to insulated piping with preformed aluminum snap straps and stainless steel strapping installed with special banding wrench.
- B. Jacket exposed insulated fittings, valves and flanges with mitred sections of aluminum jacketing.
 - 1. Seal joints with sealant and secure with preformed aluminum bands.

3.08 FIELD QUALITY CONTROL

- A. Field Samples: The Owner's Representative, may at their discretion, take field samples of installed insulation for the purpose of checking materials and application. Reinsulate sample cut areas.

3.09 PIPING INSULATION SCHEDULE

- A. Insulate all cold service and hot service piping, and appurtenances except where otherwise specified.
- B. Schedule of Items Not to be Insulated:
 - 1. Chrome plated piping, unless otherwise specified.
 - 2. Exposed piping in finished spaces, serving one fixture, or piece of equipment, and which connection from the main, branch, or riser, is 24 inches or less in length.
 - 3. Water heater blow-off piping.
 - 4. Air vents, pressure reducing valves, pilot lines, safety valves, relief valves.
 - 5. Water meters.
 - 6. Piping buried in the ground, unless otherwise specified herein.
 - 7. Items installed by others, unless otherwise specified herein.
 - 8. Sanitary drainage piping, unless otherwise specified herein.
 - 9. Mechanical equipment with factory applied steel jacket.
 - 10. Hot service piping 81 degrees F to 104 degrees F.
 - 11. Flanges and unions in Type E, F, and G service piping systems.
 - 12. Sprinkler and standpipe piping, unless otherwise specified.

3.10 COLD SERVICE INSULATION MATERIAL SCHEDULE

TYPE	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
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C	Fluids (except domestic cold water) 40 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	1-1/2 & less	1
			Over 1-1/2	1-1/2
D	Domestic cold water, and as specified. 33 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	All Sizes	1/2

A. NOTES:

1. Sprinkler and Standpipe Piping (First 10 feet connected to domestic water main within building): Insulate with same materials and thicknesses specified for domestic cold water.
2. Roof Drain Bodies Below Roof, Horizontal Conductor Piping Including Drops, and First Fitting on Vertical conductor: Insulate with same materials and thicknesses specified for domestic cold water.
3. Piping Serving Handicapped Accessible Lavatories:
 - a. Insulate exposed hot and cold water supply, and waste piping with under lav piping protection cover. Install fasteners thru each pair of holes in insulated safety wrap.

3.11 HOT SERVICE INSULATION MATERIAL SCHEDULE

	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
E	Water and other fluids 105 F to 140 F.	Flex. Elastomeric Foam or Fibrous Glass	1-1/2 & Less	1
			Over 1-1/2	2
F	Water and other fluids 141 F to 250 F.	Fibrous Glass	6 & Less	2
			8 & Up	2-1/2

3.12 SCHEDULE OF METAL JACKETING FOR INSULATED PIPE

- A. Piping Exterior to Building: Jacket insulated piping with circumferentially corrugated aluminum jacketing.
1. Lap longitudinal and circumferential joints a minimum of 2 inches.
 2. Secure jacketing in place with 1/2 inch x 0.020 inch thick aluminum bands secured with aluminum wing type seals, on maximum 12 inch centers.
 3. Cover insulated fittings, valves, and offsets with mitered sections of jacketing. Seal joints with metal pipe jacket sealant, and secure with aluminum strapping and wing seals.
 4. Factory fabricated, preformed fitting covers of same material as jacketing may be used instead of mitered jacketing.
 5. Install jacketing so as to avoid trapping condensation and precipitation.

END OF SECTION

PART 1 GENERAL**1.01 SUBMITTALS**

- A. Quality Control Submittals
 - 1. Test Reports (Field Tests): Submit data for each system tested, and/or disinfected; include date performed, description, and test results for each system.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Perform factory testing of factory fabricated equipment in complete accordance with the agencies having jurisdiction.
 - 2. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction and as specified.

1.03 PROJECT CONDITIONS

- A. Protection: During test Work, protect controls, gages and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gages for field testing of systems.

1.04 SEQUENCING AND SCHEDULING

- A. Transmit written notification of proposed date and time of operational tests to the Owner's Representative at least 5 days in advance of such tests.
- B. Perform cleaning and testing Work in the presence of the Owner's Representative.
- C. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Test Equipment and Instruments: Type and kind as required for the particular system under test.
- B. Test Media (air, vacuum, water): As specified for the particular piping or system under test.
- C. Cleaning Agent (water): As specified for the particular piping, apparatus or system being cleaned.

PART 3 EXECUTION**3.01 PRELIMINARY WORK**

- A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.

3.02 PRESSURE TESTS - PIPING

- A. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.
- B. Water Systems:
 - 1. Domestic water (potable cold, domestic hot and recirculation) inside buildings:
 - a. Before fixtures, faucets, trim and accessories are connected, perform hydrostatic test at 125 psig minimum for 4 hours.
 - b. After fixtures, faucets, trim and accessories are connected, perform hydrostatic retest at 75 psig for 4 hours.
- C. Gas Piping: Before backfilling or concealment perform air test of duration and pressure as required by the local gas company. However, for gas piping designed for pressures of from 4 inches to 6 inches water column, air test at 15 inches Hg for one hour, without drop in pressure. Test gas piping with air only. Check joints for leaks with soap suds.
- D. Air Piping:
 - 1. Compressed Air: Test with air at 150 psig for one hour.
 - 2. Check joints for leaks with soap suds.
- E. Vacuum Piping: Perform air test at 150 psig for one hour, followed by a vacuum test of 25 inches Hg for one hour, during which time the mercury shall remain stationary for the last 30 minutes of test.
- F. Gasoline Piping: As Specified under the Section entitled "Fuel Dispensing System".
- G. Drainage, Vent, Conductor and Roof Drain Piping (Inside Buildings): Perform tests before fixtures are installed. Test by filling the entire system with water, and allowing to stand for 3 hours, with no noticeable loss of water. Test joints under a minimum head of 10 feet of water, except the uppermost section. Test the uppermost section to overflowing.

3.03 TESTING OF EQUIPMENT, APPARATUS AND APPURTENANCES

- A. Relief Valves: Increase pressure in equipment or apparatus to relief valve setting, to test opening of valves at required relief pressures.

3.04 DISINFECTION OF POTABLE WATER SYSTEMS

- A. Disinfect potable water pipe and equipment installed in the Work of this Contract.
 - 1. Completely fill the piping, including water storage equipment if installed, with a water solution containing 50 mg/L available chlorine, and allow stand for 24 hours. Operate all valves during this period to assure their proper disinfection.
 - 2. After the retention period, discharge the solution to an approved waste and flush the system thoroughly with water until substantially all traces of chlorine are removed. Drain and flush water storage equipment if installed.
- B. Connect plumbing fixtures and equipment and place the system into service. Prevent recontamination of the piping during this phase of the Work.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Domestic water piping and fittings
- B. Domestic water plastic piping and fittings
- C. Sanitary and storm piping and fittings
- D. Sanitary piping and fittings for acid waste applications

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Through Penetration Firestops: Section 078400.
- B. Sealants: Section 079200.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Catalog sheets and specifications indicating manufacturer name, type, applicable reference standard, schedule, or class for specified pipe and fittings.
 - 2. Material Schedule: Itemize pipe and fitting materials for each specified application in Pipe and Fittings Schedule in Part 3 of this Section. Where optional materials are specified indicate option selected.
- B. Quality Control Submittals
 - 1. Copy of hydraulic press fitting manufacturer's printed field inspection procedures for hydraulic press joints in domestic tubing.

PART 2 PRODUCTS

2.01 STEEL PIPE AND FITTINGS

- A. Steel Pipe for Threading: Standard weight, Schedule 40, black or galvanized; ASTM A 53 or ASTM A 135.
- B. Cast Iron Fittings:
 - 1. Drainage Pattern, Threaded: ASME B16.12.

2.02 COPPER AND BRASS PIPE, TUBING AND FITTINGS

- A. Copper Tube, Types K, L, and M: ASTM B 88.
- B. Wrot Copper Tube Fittings, Solder Joint: ASME B16.22.
- C. Cast Copper Alloy Tube Fittings, Solder Joint: ASME B16.18.
- D. Drainage Tube, Type DWV: ASTM B 306.
- E. Wrot Copper Drainage Tube Fittings, Solder Joint: ASME B16.29.
- F. Cast Copper Alloy Drainage Fittings, Solder Joint: ASME B16.23.
- G. Unions: Cast bronze, 150 lb Class, bronze to bronze seats, threaded or solder joint.

- H. Plumber's Tube: Seamless, semi-annealed, minimum 65 percent copper, No. 18 B & S Gage.
- I. Flared Tube Fittings:
 - 1. Water Tube Type: ASME B16.26.
- J. Flanges: Conform to the Standards for fittings used in systems.
 - 1. Brazing Flanges: ASME B16.24, hubs modified for brazing ends.

2.03 HYDRAULIC PRESS FITTINGS FOR COPPER TUBING

- A. Acceptable Fittings:
 - 1. ProPress by Viega, 301 N. Main, Wichita, KS 67202, (877) 843-4262, www.viega.com.
 - 2. Operating Conditions:
 - a. Maximum Operating Pressure: 200 psi.
 - b. Operating Temperature Range: 0-250 degrees F.
 - c. Maximum Test Pressure: 600 psi.
 - d. Maximum Vacuum: 29.2 inches hg @ 68 degrees F.
 - 3. Features:
 - a. Fittings: Copper and copper alloy conforming to material requirements of ASME B16.18 or ASME B16.22.
 - 1) Stainless Steel Grip Ring: Adds strength to the joint without collapsing the interior passageway
 - b. No flame for soldering required for installation of fittings and valves.
 - c. Unpressed connections identified during pressure testing when water flows past sealing element.
 - d. Sealing Elements: Factory installed, EPDM.
 - e. Fittings that have been pressed can be rotated. If rotated more than 5 degrees, the fitting must be repressed to restore its resistance to rotational movement.
 - f. Extended fitting end lead allows for twice the retention grip surface, and assists with proper tube alignment.
 - g. Soldered adapter fittings are not allowed.

2.04 CAST IRON PIPE AND FITTINGS

- A. Bell and Spigot Soil Pipe: Service Weight, Bitumin coated; ASTM A 74.
- B. Bell and Spigot Soil Pipe Fittings: Service Weight, Bitumin coated; ASTM A 74.
- C. Hubless Pipe: Bitumin coated; Cast Iron Soil Pipe Institute Standard No. 301.
- D. Hubless Pipe Fittings: Drainage Pattern, Bitumin coated; Cast Iron Soil Pipe Institute Standard No. 301.
- E. Hubless Joint Couplings: Stainless steel shield and clamp assembly, and elastomer sealing sleeve; CISPI-310.
- F. Water Pipe Fittings: Bitumin coated, cement-mortar lined; AWWA C110.

2.05 DUCTILE IRON PIPE AND FITTINGS

- A. Water Pipe: Bitumin coated and cement-mortar lined; AWWA C151.
 - 1. 3 and 4 Inch Sizes: Class 51.
 - 2. 6 inch Size and Over: Class 50.
- B. Fittings: Bitumin coated and cement-mortar lined; AWWA C110.

2.06 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

- A. Couplings: Grinnell Corp.'s Rigidlok Fig. 7401, or Victaulic Co.'s Style 107, having minimum pressure rating of:
 - 1. 750 psi from 1-1/2 inch to 4 inch.
 - 2. 700 psi for 6 inch.
 - 3. 600 psi for 8 inch.
 - 4. Couplings: Gustin-Bacon Inc.'s No. 100 Gruvagrips, or Victaulic Co.'s Style 77, having pressure rating of:
 - a. 1000 psi for 3/4 inch to 6 inch.
 - b. 800 psi for 8 inch to 12 inch.
 - c. 300 psi for 14 inch to 24 inch.
 - 5. Fittings: By same manufacturer as couplings, having pressure ratings equal to or greater than couplings. Comply with the following standards:
 - a. Steel: ASTM A 53 or A 106, Grade B.
 - b. Malleable Iron: ASTM A 47.
 - c. Ductile Iron: ASTM A 536.

2.07 ACID WASTE PIPE, FITTINGS AND COUPLINGS

- A. Glass Drainline Piping: Tempered and annealed borosilicate glass pipe and fittings, FS DD-G-541A; Schott Process Systems, Inc., 1640 S.W. Boulevard, Vineland, NJ 08360, or QVF Process Systems, Inc., 35 West William St., Corning, NY 14830.
 - 1. Drainline Couplings: Compression type; comprised of a stainless steel outer shell and bolting assembly, a Buna-N Rubber Compression liner, and a seal ring gasket of tetra-fluoro-ethylene; Schott Process Systems or QVF Process Systems.
 - 2. High Silicon Cast Iron Pipe and Fittings: Acid resistant cast iron bell and spigot pipe and fittings, containing not less than 14 percent silicon.

2.08 JOINING AND SEALANT MATERIALS

- A. Thread Sealant:
 - 1. LA-CO Industries', Slic-Tite Paste with Teflon.
 - 2. Loctite Corp.'s No. 565 Thread Sealant.
 - 3. Thread sealants for potable water shall be NSF approved.
- B. Solder: Solid wire type conforming to the following:
 - 1. Type 3: Lead-free tin-silver solder (ASTM B 32 Alloy Grade E, AC, or HB); Engelhard Corp.'s Silvacrite 100, Federated Fry Metals' Aqua Clean, or J.W. Harris Co. Inc.'s Stay-Safe Bridgit.
- C. Soldering Flux for Soldered Joints: All-State Welding Products Inc.'s Duzall, Engelhard Corp.'s General Purpose Liquid or Paste, Federated Fry Metals' Water Flow 2000, or J.W. Harris Co. Inc.'s Stay-Clean.
- D. Lead for Calking Joints in Cast Iron Soil Pipe: ASTM B 29 for pig lead.
- E. Joint Packing:
 - 1. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504) 466-1484.
 - 2. Acid Resistant Joint Packing: Sealite Inc.'s Red Stripe, Asbestos-Free Acid-Resistant White Oakum, No. 312.

- F. Gaskets For Use With Ductile Iron Water Pipe and Cast Iron Drainage Pipe: Synthetic rubber rings (molded or tubular): Clow Corp.'s Belltite, Tyler Pipe Industries Inc.'s Ty-Seal, or U.S. Pipe and Foundry Co.'s Tyton.
- G. Flange Gasket Material:
 - 1. For Use with Cold Water: 1/16 inch thick rubber.
 - 2. For Use with Hot Water, or Air : Waterproofed non-asbestos ceramic or mineral fiber, or a combination of metal and water-proofed non-asbestos ceramic or mineral fiber, designed for the temperatures and pressures of the piping systems in which installed.
- H. Gaskets For Use With Grooved End Pipes and Fittings: Type and materials as recommended and furnished by the fitting manufacturer, for the service of piping system in which installed.

2.09 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

- A. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504)466-1484.

2.10 DIELECTRIC CONNECTORS

- A. Dielectric Fitting: Bronze ball valve with end connections and pressure rating to match associated piping.
 - 1. Nipples with inert non-corrosive thermoplastic linings are not acceptable.
 - 2. Flange Electrical Insulation Kit: Consisting of dielectric sleeves and washers, and dielectric gasket.
 - a. Rated 150 psi at 250 degrees F: ANSI Class 150, full faced neoprene gasket with bolt holes, double phenolic washers, and mylar sleeves; Model 150 by APS, Lafayette, LA 70596, (337) 233-6116.

2.11 PIPE SLEEVES

- A. Type A: Schedule 40 steel pipe.
- B. Type B: No. 16 gage galvanized sheet steel.
- C. Type C: Schedule 40 steel pipe with 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.
- D. Type D: No. 16 gage galvanized sheet steel with 16 gage sheet steel metal collar rigidly secured to sleeve. Size metal collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.

2.12 FLOOR, WALL AND CEILING PLATES

- A. Cast Brass: Solid type with polished chrome plated finish, and set screw.
 - 1. Series Z89 by Zurn, 929 Riverside Drive, Grosvonordale, CT 06255, (800) 243-1830.
 - 2. Model 127XXXX by Maguire Mfg., Cheshire CT 06410, (203) 699-1801.
 - 3. Stamped Steel: Split type, polished chrome plated finish, with set screw.
 - a. Figures 2 and 13 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.
 - 4. Cast Iron or Malleable Iron: Solid type, galvanized finish, with set screw:
 - a. Model 395 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.
 - b. Model 900-016XX by Landsdale International, Westville, NJ 08093, (800) 908-0523.

2.13 FLEXIBLE CONNECTIONS

- A. Underground Application:
 - 1. Acceptable Companies:
 - a. Titeflex Inc., Springfield, MA.
 - b. Flex-ing, Sherman, TX.
 - 2. Features:
 - a. Construction: Stainless steel innercore covered with braided Type 304 stainless steel outer jacket.
 - b. UL listed for underground fuel storage tank systems.
 - c. Permanently crimped stainless steel collars with one threaded end and one threaded swivel end.
- B. Underground or Above Ground Application:
 - 1. Acceptable Companies:
 - a. Titeflex Inc., Springfield, MA.
 - b. Flex-ing, Sherman, TX.
 - 2. Features:
 - a. Construction: Convoluted, Type 321 stainless steel inner core, minimum .012 inch wall thickness covered with braided Type 304 stainless steel outer jacket.
 - b. UL listed for above ground and underground use.
 - c. Factory installed male swivel on one end.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install piping at approximate locations indicated, and at maximum height.
- B. Install piping clear of door swings, and above sash heads.
- C. Make allowances for expansion and contraction.
- D. Allow for a minimum of one inch free air space around pipe or pipe covering, unless otherwise specified.
- E. Install horizontal piping with a constant pitch, and without sags or humps.
 - 1. Water Piping: Pitch 1/4 inch per 10 feet upward in direction of flow, unless otherwise noted. If it is not possible to maintain constant pitch, establish a new low point and continue. At the low point, provide a 1/2 inch drip leg and gate valve with a hose bibb end. Provide an air vent at the high point.
 - 2. Drainage Piping: Pitch 1/4 inch per foot downward, in direction of flow, unless otherwise noted.
 - 3. Vent Piping: Pitch 1/4 inch per foot upward, unless otherwise noted.
- F. Install vertical piping plumb.
- G. Use fittings for offsets and direction changes, except for Type K soft annealed copper temper water tube.
- H. Cut pipe and tubing ends square; ream before joining.

3.02 DRAINAGE SYSTEMS

- A. Fittings:

1. Use long turn drainage pattern fittings, unless space conditions prohibit their use; in such cases, short turn pattern fittings may be used.
 2. Vertical Offsets: Make vertical offsets with 45 degree elbows, or 1/8 bends.
 3. Tucker Fittings: Tucker fittings may only be installed in vertical piping.
- B. Cleanouts:
1. Install cleanouts with sufficient side and end clearance to allow for the removal of the cleanout plug, and the use of cleaning tools.
 2. Lubricate cleanout plugs with anti-seize lubricant.

3.03 DOMESTIC WATER PIPING SYSTEM

- A. Connect runouts to the upper quadrant of the main, and run upward at not less than 45 degrees before extending laterally.
- B. Make final connections to plumbing fixtures and equipment with unions, or flanges:
1. Do not use unions in ferrous piping larger than 3 inches.
 2. Do not use unions in brass or copper piping larger than 2 inches.

3.04 PIPE JOINT MAKE-UP

- A. Soldered Joint: Thoroughly clean tube end and inside of fitting with emery cloth, sand cloth, or wire brush. Apply flux to the pre-cleaned surfaces. Install fitting, heat to soldering temperature, and join the metals with type solder specified. Remove residue.
- B. Flanged Pipe Joint:
1. Install threaded companion flanges on steel pipe; flanges on galvanized pipe are not required to be galvanized.
 2. Provide a gasket for each joint.
 - a. Hot Water Pipe Gasket: Coat with a thin film of oil before making up joint.
 - b. Air Pipe Gasket: Coat with a thin film of oil before making up joint.
 3. Coat bolt threads and nuts with anti-seize lubricant before making up joint.
- C. Calked Joint: Pack hub with joint packing specified, and calk. Run 12 ounces molten lead for each inch of pipe diameter. Calk cooled lead ring and face off smoothly.
- D. Rubber Ring Push-on Joint: Clean hub, bevel spigot, and make up joint with lubricated gasket in conformance with the manufacturer's printed installation instructions.
- E. Grooved Pipe Joint: Roll groove pipe ends, make up joint with grooved end fittings and couplings, in conformance with the manufacturer's printed installation instructions.
1. Cut grooved end piping is not acceptable.
- F. Hubless CI Pipe Joint: Make up joint with hubless fitting and couplings, in conformance with the manufacturer's printed installation instructions.
- G. Mechanical Joint: Make up joint in conformance with the manufacturer's printed installation instructions, with particular reference to tightening of bolts.
- H. Glass Pipe Joint: Make up joint with glass drainline fittings and couplings in conformance with the manufacturer's printed installation instructions.
- I. Polyethylene Containment Pipe Joint: Follow manufacturer's printed installation instructions.
- J. High Density Polyethylene Pipe Joint (HDPE): Follow manufacturer's printed installation instructions.

- K. Hydraulic Pressed Joint: Follow manufacturer's printed installation instructions.
- L. Dissimilar Pipe Joint:
 - 1. Joining Bell and Spigot and Threaded Pipe: Install a half coupling on the pipe or tube end to form a spigot, and calk into the cast iron bell.
 - 2. Joining Dissimilar Threaded Piping: Make up connection with a threaded coupling or with companion flanges.
 - 3. Joining Dissimilar Non-Threaded Piping: Make up connection with adapters recommended by the manufacturers of the piping to be joined.
 - 4. Joining Galvanized Steel Pipe and Copper Tubing: Make up connection with a dielectric connector.
 - 5. Joining FRP and Threaded Pipe: Make up connection with adapters as recommended by manufacturers of piping being joined.

3.05 PIPING PENETRATIONS

- A. Sleeve Schedule: Unless otherwise shown, comply with the following schedule for the type of sleeve to be used where piping penetrates wall or floor construction:

1. CONSTRUCTION	SLEEVE TYPE
a. Frame construction.	None Required
b. Foundation walls.	A*
c. Non-waterproof interior walls.	B*
d. Non-waterproof interior floors on metal decks.	D*
e. Non-waterproof interior floors not on metal decks.	B*
f. Floors not on grade having a floor drain.	A
g. Floors over mechanical equipment, steam service, machine, and boiler rooms.	A
h. Floors finished or to be finished with latex composition or terrazzo, and on metal decks.	D*
i. Floors finished or to be finished with latex composition or terrazzo, and not on metal decks.	A
j. Earth supported concrete floors.	None Required
k. Exterior concrete slabs on grade.	A
l. Fixtures with floor outlet waste piping.	None Required
m. Metal roof decks.	C
n. Non-metal roof decks.	A
o. Waterproof floors on metal decks.	D
p. Waterproof floors not on metal decks.	A
q. Waterproof walls.	A

*Core drilling is permissible in lieu of sleeves where marked with asterisks.

- B. Diameter of Sleeves and Core Drilled Holes:
 - 1. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.
 - 2. Size holes thru exterior walls or waterproofed walls above inside earth or finished floors, and exterior concrete slabs in accordance with the following:
 - a. Uninsulated (Bare) Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of pipe, unless otherwise specified.

- b. Insulated Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of insulation, unless otherwise specified.
 - c. Mechanical Modular Seals: Size holes in accordance with the manufacturer's recommendations.
 - 3. Size holes for sprinkler and fire standpipe piping in accordance with NFPA 13.
- C. Length of Sleeves (except as shown otherwise on Drawings):
 - 1. Walls and Partitions: Equal in length to total finished thickness of wall or partition.
 - 2. Floors with Finish: Equal in length to total finished thickness of floor and extending 1/2 inch above the finished floor level, except as follows:
 - a. In furred spaces at exterior walls, extend sleeve one inch above the finished floor level.
 - 3. Exterior Concrete Slabs: Equal in length to total thickness of slab and extending 1/2 inch above the concrete slab.
 - 4. Roofs: Equal in length to the total thickness of roof construction, including insulation and roofing materials, and extending one inch above the finished roof level.
- D. Packing of Sleeves and Core Drilled Holes:
 - 1. Unless otherwise specified, pack sleeves or cored drilled holes in accordance with Section 078400 - FIRESTOPPING.
 - 2. Pack sleeves in exterior walls or waterproofed walls above inside earth or finished floors with oakum to within 1/2 inch of each wall face, and finish both sides with Type 1C (one part) sealant. See Section 079200.
 - a. Mechanical modular seals may be used in lieu of packing and sealant for sleeves and core drilled holes.
 - 3. Pack sleeves in exterior concrete slabs with oakum to full depth, and within 1/2 inch of top of sleeve and finish the remainder with sealant. See Section 079200.
 - a. Sealant Types:
 - 1) Piping Conveying Materials up to 140 degrees F other than Motor Fuel Dispensing System Piping: Type 1C (one part).
 - b. Mechanical modular seals may be used in lieu of packing and sealant for sleeves and core drilled holes.
- E. Weld metal collars of Type C and D sleeves to the upper surface of the metal deck. Seal voids under the metal collar as recommended by the manufacturer of the metal deck.

3.06 FLOOR, WALL AND CEILING PLATES

- A. Install plates for exposed uninsulated piping passing thru floors, walls, ceilings, and exterior concrete slabs as follows:
 - 1. In Finished Spaces:
 - a. Piping 4 Inch Size and Smaller: Solid or split, chrome plated cast brass.
 - b. Piping Over 4 Inch Size: Split, chrome plated cast brass.
 - c. Unfinished Spaces (Including Exterior Concrete Slabs): Solid, unplated cast iron.
 - d. Fasten plates with set screws.
 - e. Plates are not required in pipe shafts or furred spaces.

3.07 PIPE AND FITTING SCHEDULE

- A. Where options are given, choose only one option for each piping service. No deviations from the selected option will be allowed.
- B. Acid Waste (Above Ground):
 - 1. Glass drainline pipe, fittings and couplings.

2. High silicon cast iron bell and spigot pipe and fittings, with joints calked with lead and acid resistant joint packing.
- C. Acid Waste (Below Ground): High silicon cast iron bell and spigot pipe and fittings, with joints calked with lead and acid resistant joint packing.
- D. Domestic Water (Above Ground):
 1. 3 inch and Under: Type L hard drawn copper tube, with cast copper alloy or wrought copper solder type fittings, and joints made up with Type 3 solder, or hydraulic press joints.
 2. 4 inch and Over: Coated ductile iron water pipe and fittings, with mechanical or push-on joints installed as per manufacturer's instructions.
- E. Domestic Water:
 1. 2 inch and Under: Crosslinked polyethylene (PEX) tubing PEX-A method with Mechanical or Push-fit joints. Install as per Manufacturer's recommendation.
 2. 2-1/2" inch and Over: Chlorinated Polyvinyl Chloride (CPVC) plastic piping with Mechanical Joints, Solvent Cementing, or Push-fit Joints installed as per manufacturer's instructions.
- F. Domestic Water (Below Ground):
 1. 2-1/2 inches and Under: Type K soft annealed copper tube with water tube type flared fittings.
 2. 3 inches and Over: Coated ductile iron water pipe and fittings, with mechanical or push-on joints.
- G. Drainage (Sanitary) Above Ground:
 1. Service weight, coated, cast iron bell and spigot pipe and fittings with calked joints.
 2. Service weight, coated, cast iron bell and spigot pipe and fittings with rubber ring push-on joints.
 3. Hubless, coated, cast iron pipe, fittings, and joint couplings.
 4. DWV copper tubing, with cast brass or wrought copper drainage pattern fittings, and joints made with Type 3 solder.
- H. Drainage (Storm) Above Ground:
 1. Service weight, coated, cast iron bell and spigot pipe and fittings, with calked joints.
 2. Service weight, coated, cast iron bell and spigot pipe and fittings, with rubber ring push-on joints.
 3. Hubless, coated, cast iron pipe, fittings and joint couplings.
 4. DWV copper drainage tube, with cast copper alloy or wrought copper drainage pattern fittings, and joints made up with Type 3 solder.
- I. Drainage Piping (Below Ground):
 1. Option No. 1: Service weight, coated, cast iron bell and spigot pipe and fittings, with calked joints.
 2. Option No. 2: Service weight, coated, cast iron bell and spigot pipe and fittings, with rubber ring push-on joints.
- J. Vent Piping: Same materials that are used for piping system to which vent is connected.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Water hammer arrestors
- B. Fasteners

1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, dimensional data, and installation instructions for each item specified, excluding fasteners.

1.03 MAINTENANCE

- A. Special Tools: Deliver to the Owner's Representative.
 - 1. Wall Hydrant T-Handle Locking Key: One for each wall hydrant.
 - 2. Tools For Vandal Resistant Fasteners: One for each type and size.

PART 2 PRODUCTS**2.01 WATER HAMMER ARRESTORS**

- A. Hydropneumatically controlled with permanently sealed expansion chamber pre-charged with non-combustible gas, threaded connection, and conforming to ASME A112.26.1M - Water Hammer Arrestors, and ASSE 1010 - Water Hammer Arrestors.
 - 1. Bellows Type: Stainless steel construction with elastomer or stainless steel bellows.
 - 2. Piston Type: Hard drawn copper body with brass piston, cap and adapter; and elastomer seals.

2.02 FASTENERS

- A. Vandal Resistant Fasteners: Torx head with center pin.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.
- B. Wall Hydrants:
 - 1. Installation Height: Minimum 18 inches above finished grade.
- C. Secure external components in place with vandal resistant fasteners or devices which cannot be removed without special tools.

END OF SECTION

PART 1 GENERAL**1.01 SUBMITTALS**

- A. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for each type of mixing valve.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements: Unless otherwise shown or specified, comply with the applicable requirements of FS WW-P-541.

PART 2 PRODUCTS**2.01 VALVES - GENERAL**

- A. Valve Body: Cast brass.
- B. Internal Components:
 - 1. Metals: Brass, or stainless steel.
 - 2. Non-Metals: Materials not adversely affected by contact with water, temperature changes, and normal wear.
- C. Finishes: Furnish polished, chrome plated brass, or No. 4 brush finished stainless steel on exposed to view surfaces installed in finished spaces.
- D. Single Handle Mixing Valves:
 - 1. Operation: Valve shuts off in full cold position, and must pass through cold range before delivering warm, and/or hot water.
 - 2. Temperature Limit Stop: Factory set for 105 degrees F maximum delivery temperature.
 - 3. Automatic Shut-Down: If one supply should fail, the other will automatically and instantly shut down.

2.02 VALVE TYPES

- A. Type A: Thermostatically operated by means of bi-metallic strip, or expansion bellows.
 - 1. Accessories: Combination stop, check and removable strainer.
 - 2. Temperature Range: Cold through 115 degrees F.
- B. Type B: Single handle mechanical mixer, or individual hot and cold control valves.
 - 1. Individual Control Valves: Fit with four-arm indexed metal handles, which turn counter to each other for on and off positions.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install the Work of this section in accordance with the manufacturer's printed installation instructions.

3.02 FIELD QUALITY CONTROL

- A. Capacity Check: Operate valve through entire range, and verify rated capacity. Correct discrepancies.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thermometers
- B. Thermometers for measuring liquid temperature
- C. Pressure and compound gagues

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Valves: Section 220523.
- B. Pumps: Section 221123.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for each item specified.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Where Federal, NSF, ASME or other standards are indicated or required, products shall meet or exceed the standards established for material, quality, manufacture and performance.

PART 2 PRODUCTS

2.01 MANUFACTURERS/COMPANIES

- A. Dresser Instruments.
- B. Marsh Bellofram.
- C. Moeller Instrument Co.
- D. Taylor Precision Products.
- E. H.O. Trerice Co.
- F. Weksler Instruments Corp.

2.02 THERMOMETERS

- A. General Design Features:
 - 1. Scale Ranges: 1-1/2 times actual working temperature required for the particular application, as approved.
 - a. Maximum of two degrees between graduations and ten degrees between numerals.
 - b. When scale ranges are in excess of 100 degrees, maximum range between numerals may be 20 degrees, or as otherwise approved for the particular application.
 - 2. Direct Reading Thermometers: Bimetallic actuated, dial type, straight pattern, angle pattern, or adjustable angle pattern as required.
 - 3. Remote Reading Thermometers: Vapor tension actuated, or gas actuated type, with extension capillary tube of length as required for the particular application.
 - a. Case type as required for the particular mounting application.

4. Thermometers for Sensing Liquid Temperature: Furnish with separable sockets.
 - a. Sockets for Use in Insulated Piping, Insulated Tanks or Similar Equipment: Extension lagging neck type, of length as required to compensate for insulation thickness, and proper immersion..

2.03 THERMOMETERS FOR MEASURING LIQUID TEMPERATURE

- A. Bimetallic Actuated Thermometers: Comply with ASME B40.3, Accuracy Grade A.
 1. Construction: Type 304 stainless steel, all welded construction, with clear acrylic plastic or shatterproof glass crystal.
 2. Dial: White enamel background with bold black figures and graduations.
 3. Head Size:
 - a. Installation in Piping: 3inch diameter.
 - b. Installation in Tanks and Similar Equipment: 5 inch diameter.
 4. Stem: Length as required for proper immersion, and to compensate for insulation thickness, with threaded connection for socket.
 5. External Calibration Device.
 6. Separable Socket:
 - a. Water Service: Brass or bronze.
- B. Vapor Tension or Gas Actuated Capillary Thermometers: Adjustable type, with micrometer type pointer or external calibration device, of design and materials as follows:
 1. Case and Ring: Stainless steel or non-ferrous material as approved, with clear acrylic or shatterproof glass lens. Provide case of type as required for the particular mounting application. Case adjustable, allowing rotation of 360°, and stem adjustment of at least 180°. Provide set screw for locking case in desired position.
 2. Movement: Brass with bronze bearings.
 3. Dial: White enamel background, with bold black graduations, numerals and pointer; 3-1/2 inch diameter.
 4. Capillary: Stainless steel.
 5. Bulb: Copper with union well connection.
 6. Separable Socket:
 - a. Water Service: Brass or bronze.

2.04 PRESSURE AND COMPOUND GAUGES

- A. Type: Adjustable dial type with micrometer type pointer, or external calibration device, bronze bourdon tube, and bronze bushed rotary movement.
- B. Dial: White enameled background, and bold black graduations, numerals and pointer; 3-1/2 inch diameter.
 1. Scale Range:
 - a. Standard Gauges: Double normal operating pressure.
 - b. Compound Gauges: From 30" Hg vacuum to double normal operating pressure.
- C. Case: Cast aluminum, brass, or black finished phenolic.
- D. Accuracy: Guaranteed of within 1 percent in middle third of dial range.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Thermometers:
 1. Install in accordance with the manufacturer's printed installation instructions.

2. Install direct reading thermometers, when the application requires installation 6 feet or less above the floor or bottom of space in which installed, and remote reading type when the installation is over 6 feet.
- B. Pressure and Vacuum Gauges:
1. Install in accordance with the manufacturer's printed installation instructions.
 2. For measuring liquid pressure, install gauges complete with stop cocks and drain cocks.
- C. Pressure Snubbers and Impulse Dampers:
1. Install pressure snubbers in the piping connections to gauges installed in suction and discharge piping connections to close coupled and base mounted circulating pumps driven by motors under 10 HP.
 2. Install impulse dampers in the piping connections to gauges installed in suction and discharge piping connections to close coupled and base mounted circulating pumps driven by motors 10 HP and over.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lavatory
- B. Supports and supporting devices for wall-mounted lavatories, sinks, and equipment
- C. Countertop sink
- D. Vitreous china water closets
- E. Water closet carrier
- F. Flush valves

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Sealants: Section 079200.

1.03 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, roughing dimensions, and installation instructions for each item specified except fasteners.
 - 1. Deliver cut out data for countertop fixtures to the Owner's Representative.
- B. Samples:
 - 1. Water Closet Seat: One seat if other than product specified. Sample will be returned and if approved, may be installed on the Project.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with applicable requirements of FS WW-P-541, and the following standards:
 - a. ANSI/ASME A112.6.1M - Floor Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.
 - b. ANSI/ASME A112.18.1M - Plumbing Fixture Fittings.
 - c. ANSI/ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures.
 - d. ANSI/ASME A112.19.2M - Vitreous China Plumbing Fixtures.
 - e. ANSI/ASME A112.19.6 - Hydraulic Requirements for Water Closets and Urinals.
 - 2. Materials and installations designated as handicapped accessible shall conform with the following:
 - a. ANSI A117.1 - Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.
 - b. The Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG), (Appendix A to 28 CFR Part 36).
 - c. The Uniform Federal Accessibility Standards (UFAS), (Appendix A to 41 CFR Part 101-19.6).
 - 3. Each fixture carrier support shall be listed by model number in the fixture support manufacturer's Fixture Support Selection Guide as being recommended for support of the appropriate fixture.
- B. Plainly and permanently mark each fixture and fitting with the manufacturer's name or trade mark.

- C. Acid resistant surfaces shall be plainly and permanently marked with the manufacturer's label or symbol indicating acid resistance.

1.05 MAINTENANCE

- A. Special Tools: Deliver to the Owner's Representative.
 - 1. Furnish the following tools labeled with names and locations where used.
 - a. Keys for stops (furnished with stops).
 - b. Tools for Vandal Resistant Fasteners: Two for each type and size.

PART 2 PRODUCTS

2.01 MATERIALS - GENERAL

- A. Vitreous China: First quality, smooth, uniform color and texture, with fused on glaze covering surfaces exposed to view.
 - 1. Surfaces shall be free of chips, craze, warpage, cracks and discolorations. Surfaces in contact with walls or floors shall be flat, with warpage not to exceed 1/16 inch per foot.
 - 2. Color: White.
- B. Porcelain Enameled Cast Iron: Smooth, uniform color and texture, having fused on glaze covering surfaces exposed to view.
 - 1. Material shall show no cracks, chips, craze or discolorations.
 - 2. Enameled surfaces shall be acid resistant unless otherwise specified.
 - 3. Color: White.
- C. Fixture Trim: Brass, bronze, or stainless steel construction; consisting of supply and waste fittings, faucets, traps, stop valves, escutcheons, sink strainers, nipples, supplies, and metal trim.
 - 1. Brass piping: 1/2" standard weight, with standard weight, 125 lb cast brass fittings.
 - 2. Brass tubing: 1/2" B & S gage.
 - 3. Stainless steel: 1/2"-8 Type 302 or 304 unless otherwise specified.
- D. Fixture Trim Finishes:
 - 1. Brass or Bronze: Polished or satin finished chrome plating, 0.02 mil chromium over 0.2 mil nickel plating.
 - 2. Stainless Steel: Invisible welds and seams, and unless otherwise specified, polished to No. 4 commercial finish.
- E. Fixture Hold-down Bolts: Steel, plated for corrosion resistance.
 - 1. Cap nuts: Metal, polished and chrome plated.
- F. Combination Faucets: Faucets shall turn counter to each other for the on and off positions.
- G. For Vandal Resistant Fixtures - Fasteners: Torx head with center pin.

2.02 LAVATORY

- A. Fixture: See plans for make and model.
- B. Supply Fitting: See plans for make and model.
 - 1. Maximum Flow: 0.5 gpm at 80 psi.
 - a. Exception: Metering faucets shall have a maximum flow of 0.25 gallons per cycle.
 - 2. Over rim spout with aerator.
 - 3. Renewable operating units.

4. Vandal resistant assembly.
 5. 1/2 inch inlet lock nut and coupling nut.
 6. Operators:
 - a. Standard Fixtures: Metal four arm indexed handles, with either integral splines, or ceramic spline inserts. Plastic spline inserts will not be accepted.
 - b. Handicapped Accessible Fixtures: Metal 4 inch minimum indexed blade handles set, with either integral splines, or ceramic spline inserts. Plastic spline inserts will not be accepted.
 - 1) Maximum Activation Force: 5 lbf.
- C. Waste Fitting: Grid Strainer.
1. Metal grid strainer to match fixture finish.
 2. Cast escutcheon.
 3. 1-1/4 inch tailpiece.
 4. Vandal resistant assembly.
- D. Trap: Cast brass, non-adjustable P trap, 1-1/4 inch tubing inlet, 1-1/2 inch ips outlet.
1. Bottom cleanout plug.
 2. Ips brass nipple with solid cast brass escutcheon.
- E. Supplies: 3/8 inch ips brass with operated stops and solid cast brass escutcheons.
1. Wall Supplies: Angle stops.
- F. Faucet Hole Cover: Cast brass, rounded top, and threaded shank, with backing plate, lock washer and nut.

2.03 FIXTURE SUPPORTS AND SUPPORTING DEVICES FOR LAVATORIES, SINKS, AND EQUIPMENT

- A. General: Ferrous metal members of carriers and supporting devices with the exception of chrome plated or porcelain enameled cast iron, shall be factory painted for corrosion resistance.
- B. Floor Mounted Carrier Supports: Steel pipe uprights, 1-1/4 inch ips minimum diameter, or 1 inch x 3 inch steel tubing uprights, with cast iron or welded steel feet, drilled for bolting to the floor construction. Each carrier shall be provided with the appropriate fixture supporting devices specified, or recommended by the carrier manufacturer's Fixture Support Selection Guide.
1. Concealed Arms: Steel, with fixture locking lugs, leveling screws and a means of attaching, positioning and securing the fixture to the carrier.
 - a. Trim: Polished, chrome plated metal escutcheon to space fixture two inches from the wall.
 - b. Vandal Resistant Trim: Polished, chrome plated metal cap nuts and washers retained with vandal resistant set screws or other approved means of securing trim.
- C. Wood Stud Filler Piece: 2 inch x 8 inch wood planking cut to fit between wood studding. Fasten with four 3/8 inch x 2-1/2 inch lag bolts with washers.

2.04 COUNTERTOP SINK

- A. Material: See plans for make and model.
1. Features: Self-rimming, extended back ledge, with faucet and spray hose punchings spaced on 4 inch centers. Cove corners 1-3/4 inch minimum radius; fully coat underside with sound deadening and condensation barrier.
 2. Finish: Satin finish exposed surfaces.
- B. Supply Fitting: See plans for make and model.
1. Maximum Flow: 2.5 gpm at 80 psi.

2. 8 inch swing spout.
 3. 1/2 inch inlets on 8 inch centers.
 4. Renewable units.
 5. Supplies: 1/2 inch ips brass, with angle stops, and cast brass escutcheons.
- C. Drain Assembly:
1. Stainless steel removable strainer basket with neoprene stopper and 1-1/2 inch tubing tailpiece.
- D. Fastening Devices: Stainless steel spring clip assemblies or clamping devices for securing sink to the countertop.

2.05 VITREOUS CHINA WATER CLOSETS

- A. Fixtures: See plans for make and model.
- B. Vitreous china, full size, elongated bowl with integral flushing rim and jet; trapway at the rear and the outlet centered between a pair of hold down bolt holes.
1. Trapway size: Pass minimum ball of 2 inches.
 2. Trap seal: 2 inches minimum.
 3. Water surface area: 12 inches x 10 inches minimum.
 4. Provisions for flushing:
 - a. 1-1/2 inch spud for flush valve operation.
 5. Floor Supported Fixture Heights:
 - a. Standard Fixture: 14 to 15 inches from finished floor to rim.
 - b. Handicapped Accessible Fixture: 17 to 19 inches from finished floor to top of seat (15-13/16 to 17-13/16 inches from finished floor to top of rim based on 1-3/16 inch seat height).
- C. Operation: Fixture shall flush satisfactorily without extraordinary rise of water level in the bowl.
1. Maximum gallons of water per flush: 1.28 gallons.
- D. TYPE F WATER CLOSET: Flush Tank: Vitreous china secured to and supported by the closet bowl and separate lift off cover with provisions for locking.
1. Float valve with nylon seat and vacuum breaker.
 2. Flushing valve.
 3. Metal trip lever.
 4. Supply: 1/2 inch ips brass pipe with a key operated stop and solid cast brass escutcheon.
- E. TYPE A, C, F WATER CLOSETS: Water Closet Floor Flange:
1. For Use with DWV Copper Tubing: Cast brass, 48 ounce minimum weight.
 2. For Use with Cast Iron Soil Pipe: Cast iron, 90 ounce minimum weight.
- F. Closet Seat: Extra heavy duty, commercial design; Model 1655-C by Bemis Mfg. Co., Model No. 527-CH by Beneke Corp., or Model No. 9500C by Church Seat Co.
1. Material and Construction: Solid plastic, open front, less cover, molded in one piece with no joints, seams or crevices.
 2. The manufacturer's name shall be molded into the seat.
 3. Metal check hinges shall be integrally molded into the seat. Hinges, inserts, bearings and posts shall be of brass or stainless steel. Cover upper post and metal exposed above fixture rim with plastic to match seat.
 4. Surface shall be hard, polished, impervious to moisture, and not affected by the action of uric acid.
 5. Color: White.

G. Water Closet Types:

1. Type A Water Closet: Floor supported, floor outlet, top spud inlet, siphon jet action, activated by an exposed flush valve.
2. Type C Water Closet: Floor supported, floor outlet, top spud inlet integral seat, siphon jet action, operated by means of an exposed flush valve.
3. Type E Water Closet: Wall hung, back outlet, back spud inlet, siphon jet action, activated by means of a concealed flush valve.
4. Type E-1 Water Closet: Wall hung, back outlet, top spud inlet, siphon jet action, activated by means of an exposed flush valve.
5. Type E-2 Water Closet: Wall hung, back outlet, back spud inlet, integral seat, siphon jet action, operated by means of a concealed flush valve.
6. Type F Water Closet: Floor supported, close coupled fixture-tank combination, floor outlet, siphon jet action, flush tank operated.

2.06 WATER CLOSET CARRIER

- A. Closet Carrier (For Wall Hung Water Closets): Commercial type cast iron combination chair carrier and drainage fitting with the following:
1. Face Plate: Cast iron; height adjustable.
 2. Feet: Cast iron, adjustable, with provisions for bolting to the floor slab.
 3. Studs, Nuts and Washers: Steel, treated for corrosion resistance.
 4. Fixture Washers: Plastic.
 5. Adjustable Closet Connection: Cast iron, steel, or ABS plastic.
 6. Fitting Ends: Compatible with the drainage piping system.
 7. Gasket: Impregnated felt or neoprene closet gasket; lead or neoprene face plate gasket.
 8. Stud thread protectors.
 9. Factory painted.
 10. Trim: Polished chrome plated metal cap nuts and washers.
 11. Vandal Resistant Trim: Polished chrome plated metal cap nuts and washers retained with vandal resistant set screws.
- B. Closet Carrier (Residential For Wall Hung Water Closets): Cast iron or formed steel combination fixture carrier with waste fitting, or fixture carrier with fitting adapter, and arranged for mounting to wood studding. Include the following:
1. Closet Connection: Cast iron or steel with "O" ring seal; brass for copper drainage systems; adjustable.
 2. Closet Gasket: Impregnated felt or neoprene.
 3. Waste Fitting: Same material as drainage piping.
 4. Studs, Nuts and Washers: Steel, treated for corrosion resistance.
 5. Fixture Washers: Plastic.
 6. Stud thread protectors.
 7. Factory painted.
 8. Trim: Polished chrome plated metal cap nuts and washers.
 9. Vandal Resistant Trim: Polished chrome plated metal cap nuts and washers retained with set vandal resistant screws.
- C. Ferrous metal members of carriers and supporting devices with the exception of chrome plated or porcelain enameled cast iron, shall be factory painted for corrosion resistance.

2.07 FLUSH VALVES

- A. Control Mechanism: Diaphragm or piston operated; do not intermix types. See plans for make and model.

- B. Maximum Flow Per Flush:
 - 1. Water Closet: 1.28 gallons.
 - 2. Urinal: 0.5 gallons.
- C. Flush Valve Assemblies: Flush valve, stop-check, tailpiece, vacuum breaker, and fixture spud coupling, including wall and spud flanges.
- D. Valve Materials:
 - 1. Valve Body: Brass or bronze.
 - 2. Valve Internal Parts: Corrosion resistant materials that will not be affected by the action of or contact with water.
- E. Operating Features:
 - 1. Valve operators shall employ the non hold-open feature.
 - 2. Piston type valves shall be field adjustable.
- F. Valve Operators:
 - 1. Oscillating Handle: 4 inch brass spring loaded self return handle.
 - 2. Oscillating Disc: 3 inch diameter, cast brass, spring loaded and self returning.
 - a. Concealed Installations: Furnish wall escutcheon with operators.
 - 3. Push Button Operator: 1 inch cast brass spring loaded push button, wall escutcheon, sleeve with guides and brass push rod; vandal resistant assembly.
 - 4. Maximum Activation Force (Handicapped Accessible Operators): 5 lbf.
- G. Assembly Components:
 - 1. Flush Pipe: Seamless brass tubing with integral vacuum breaker, No. 18 B & S gage.
 - 2. Fitting: Cast brass.
 - 3. Stop-Check: Brass or bronze body, non rising stem stop valve with a built-in automatic check.
 - a. Exposed Stop-Check: Screwdriver operated with protective cap.
 - b. Concealed Stop-Check: Wheel handle operated.
 - 4. Spud Coupling and Wall Flanges: Cast brass.

PART 3 EXECUTION

3.01 FIXTURE SUPPORT AND SUPPORTING DEVICE INSTALLATION

- A. Install heavy duty floor mounted carrier supports with specified fixture supporting devices for wall type plumbing fixtures.
 - 1. Secure to building construction with lag bolts and metal expansion shields, or other appropriate means as required by the construction encountered.
- B. Wall Mounted Carrier Supports: Install the following fixtures on wall mounted carrier supports:
- C. Fixture Supporting Devices: Attach fixtures by means of the following fixture supporting devices attached to carrier supports.

FIXTURE	SUPPORTING DEVICE
Clinical Service Sink	Fixture hangers & bearing
Lavatory, Vitreous China, with back	Concealed arms.
Lavatory, Vitreous China, slab type	Concealed arms.
Lavatory, Type D	Concealed arms.
Lavatory, Type E	Through bolt.

Water Closet	Bolt to comb. carrier and drainage fitting.
Urinal	Fixture hanger and bearing plate.
Drinking Fountain	Fixture hanger.
Water Cooler (wall mounted)	Fixture hanger.
Water Cooler (Recessed)	Mounting frame.

- D. Secure exposed external components in place with vandal resistant fasteners or devices which cannot be removed without the use of special tools.

3.02 FIXTURE INSTALLATION

- A. Install the Work of this section in accordance with the manufacturer's printed installation instructions.
- B. Install fixtures level and at proper height, tighten connections, and install hold-down bolts, cap nuts and cover plates, where required.
- C. Secure exposed external components in place with vandal resistant fasteners or devices which cannot be removed without the use of special tools.
- D. Bathtubs:
1. Residential Type:
 - a. Caulk joint between fixture wall and floor with Type 1D sealant; strike a neat joint.
- E. Mop Service Sinks:
1. Set receptor leveled in bed of mortar laid on clean roughened surface. Remove excess mortar and strike a neat joint.
 2. Make connection from drainage pipe to receptor drain.
 3. Caulk joints between receptor and wall or floor with Type 1D sealant; strike a neat joint.
 4. Install service fittings.
- F. Lavatories:
1. Mount lavatories 31 inches from finished floor to rim unless otherwise specified.
 2. Mount handicapped accessible fixtures 34 inches from finished floor to rim. Refer to Standard Drawing No. 93/S3013 bound herein, for special clearances required for handicapped accessible fixtures.
 3. Caulk joint between fixture back and wall with Type 1D sealant; strike a neat joint.
- G. Countertop Fixtures:
1. Install fixture with securing devices supplied.
 2. Set fixture on bedding of sealant, tighten securing devices and remove excess sealant.
- H. Water Closets:
1. Wall Hung Fixtures:
 - a. Standard Fixtures: Install wall hung fixtures 15 inches from finished floor to rim unless otherwise specified.
 - b. Handicapped Accessible Fixtures: Install fixtures 18 inches from finished floor to top of seat (16-13/16 inches floor to rim based on 1-3/16 inches seat height).
 - c. Set bearing nuts to position fixture 1/16 inch clear of finished wall.
 - d. Caulk the joint between fixture back and wall with Type 1D sealant; strike a neat joint.
 2. Floor Supported Fixtures:
 - a. Set fixture in bed of setting compound; remove excess.
 - b. Caulk base perimeter with Type 1D sealant; strike a neat joint.

3. After connections are tightened, install cap nuts and washers.
4. Install water closet seats when directed.

I. Urinals:

1. Wall Hung Fixtures:
 - a. Standard Fixtures: Install wall hung fixtures 24 inches from finished floor to rim.
 - b. Handicapped Accessible Fixtures: Install wall hung handicapped accessible fixtures 14 inches (minimum) to 17 inches (maximum) from finished floor to rim.
 - c. Set bearing nuts on floor mounted carrier supports to position wall hung fixtures 1/16 inch clear of finished wall.
 - d. Caulk the joint between fixture back and wall with Type 1D sealant; strike a neat joint.
2. Floor Supported Fixtures:
 - a. Install lip of urinal below floor level for proper floor drainage.
 - b. Set fixture in bed of setting compound; remove excess.
 - c. Caulk perimeter of fixture with Type 1D sealant; strike a neat joint.
3. After connections are tightened, install cap nuts and washers.

J. Flush Valves:

1. Standard Fixtures: Install flush valves on fixture centerline, and at following heights above fixture rim or back to centerline of water inlet to flush valve.
 - a. Water Closet: 11-1/2 inches.
 - b. Urinal: 11-1/2 inches.
2. Handicapped Accessible Fixtures: Install flush valves on fixture centerline, and at following height above finished floor to centerline of flush valve operator. Distance between centerline of flush valve operator and centerline of water inlet is 1-1/2 inches.
 - a. Water Closet: Approximately 31-1/2 inches, and mounted on wide side of stall.
 - 1) Coordinate mounting height with Construction Work Contractor to avoid interference with grab bar, and to facilitate flush valve servicing.
 - b. Urinal: Maximum 44 inches.
3. Set oscillating handles parallel to wall on exposed installation.
4. Slip joints in flush pipe connections allowed only at fixture spud and vacuum breaker ends; others shall be screwed connections.
5. Score tubing ends before assembling to assure tight slip joint connections. No score marks shall be visible after assembly.
6. In utility corridors, solder screwed flush pipe connections.

3.03 CLEANING, FLUSHING AND ADJUSTMENT

- A. Clean fixture and trim. Remove grease and dirt; polish surfaces but leave stickers and warning labels intact.
- B. Flush supply piping and traps; clean strainers.
- C. Adjust stops for proper delivery.
- D. Adjust metering faucets for proper timing.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This section describes the general requirements for all mechanical items and systems required by the Contract Documents.
- B. Comply with all Contract Requirements, General Conditions, Supplementary Conditions and Division 1 Sections applying to or affecting the Work of Division 23.
- C. Unless specifically dimensioned, the Work shown on the Drawings is in diagrammatic form only to show general arrangement.
- D. Include, in the Work, all accessories and appurtenances, necessary and integral, for the intended operation of any system, component or device, as such systems, components and devices are specified.
- E. Do not install pipe or conduit through ductwork.
- F. If the pipe or duct size shown on the Drawings does not match the connection size of the equipment that it is connected to, provide the necessary transition pieces at the piece of equipment.
- G. Do not use or allow to be used asbestos or asbestos-containing materials on this project. Be rigorous in assuring that all materials, equipment, systems and components thereof do not contain asbestos. Any deviations from this requirement shall be remedied at the Contractor's expense without regard to prior submittal approvals.

1.02 RELATED DOCUMENTS

- A. The General Conditions and General Requirements Division 1 apply to the Work of this Section.

1.03 REFERENCE STANDARDS

- A. Compliance with the following codes and standards shall be required:
 - 1. Codes, Rules and Regulations of the State of New York
 - 2. AABC American Air Balance Council
 - 3. ADC Air Diffusion Council
 - 4. AGA American Gas Association
 - 5. AMCA Air Moving and Conditioning Association
 - 6. ANSI American National Standards Institute
 - 7. ARI American Refrigeration Institute
 - 8. ASA Acoustical Society of America
 - 9. ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers
 - 10. ASME American Society of Mechanical Engineers
 - 11. ASSE American Society of Sanitary Engineers
 - 12. ASTM American Society for Testing Materials
 - 13. AWS American Welding Society
 - 14. AWWA American Water Works Association
 - 15. BSA Board of Standards and Appeals
 - 16. FM Factory Mutual
 - 17. F.S. or FED Spec. Federal Specification
 - 18. IRI Industrial Risk Insurers
 - 19. MEA Materials and Equipment Acceptance

20.	MSS	Manufacturer's Standardization Society of the Valve and Fitting Industry
21.	NACE	National Association of Corrosion Engineers
22.	NEBB	National Environmental Balancing Bureau
23.	NEC	National Electrical Code (NFPA 70) / 2020
24.	NEMA	National Electrical Manufacturers Association
25.	NFPA	National Fire Protection Association
26.	OSHA	Occupational Safety and Health Act
27.	SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
28.	TEMA	Tubular Exchanger Manufacturers Association
29.	UL	Underwriters Laboratories, Inc.
30.	USAS	USA Standards Institute (Formerly ASA)

- B. Compliance with the following Codes, Rules and Regulations and those referenced within as applicable to work in the State of New York shall be required:
1. New York State Industrial Code Rules
 2. New York State Building Code 2020
 3. New York State Fire Code 2020
 4. New York State Existing Building Code 2020
 5. New York State Fuel Gas Code 2020
 6. New York State Plumbing Code 2020
 7. New York State Energy Conservation Code 2020
 8. New York State Mechanical Code 2020
 9. International Property Maintenance Code 2021
 10. Uniform Fire Prevention and Building Code 2020
 11. ASHRAE 90.1 - 2019 (Commercial & all other Residential except Low-Rise Residential)
 12. NYStretch Energy Code 2020
 13. DEC New York State Department of Environmental Conservation - 6
NYCRR Part 613 Handling and Storage of Petroleum

1.04 DEFINITIONS

- A. "Provide" means furnish and install, complete the specified material, equipment or other items and perform all required labor to make a finished installation.
- B. "Furnish and install" has the same meaning as given above for "Provide."
- C. Refer to General Conditions for other definitions.

1.05 ABBREVIATIONS

- A. Reference by abbreviation may be made in the Specifications and the Drawings in accordance with the following list:
1. HVAC Heating, Ventilating and Air Conditioning
 2. CM Construction Manager
 3. AC Air Conditioning
 4. H & V Heating and Ventilating
 5. AWG American Wire Gauge
 6. BWG Birmingham Wire Gauge
 7. USS United States Standard
 8. B & S Brown & Sharpe
 9. OS & Y Outside Screw and Yoke
 10. IBBM Iron Body Brass Mounted
 11. WSP Working Steam Pressure
 12. PSIG Pounds per Square Inch Gauge

- 13. PRV Pressure Reducing Valve
 - 14. GPM Gallons per Minute
 - 15. MBH Thousand BTU per hour
 - 16. BTU British Thermal Units
 - 17. WG Water Gage
 - 18. LB Pound (Also shown as: #)
 - 19. ASME American Society of Mechanical Engineers
 - 20. ASTM American Society for Testing Materials
 - 21. ABMA American Boiler Manufacturers Association
 - 22. ASA American Standards Associates
 - 23. MER Mechanical Equipment Room
- See Drawings for additional abbreviations

1.06 REVIEW OF CONTRACT DOCUMENTS AND SITE

- A. Give written notice with the submission of bid to the Architect/Engineer of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules or regulations of Authorities having jurisdiction, and any necessary items of work omitted. In the absence of such written notice it is mutually agreed that the Contractor has included the cost of all required items in his proposal for a complete project.
- B. Contractors shall acknowledge that they have examined the Plans, Specifications and Site, and that from his own investigations he has satisfied himself as to the nature and location of the Work; the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials; availability of labor, utilities, roads and uncertainties of weather; the composition and condition of the ground; the characters quality and quantity of subsurface materials to be encountered; the character of equipment and facilities needed preliminary to and during the execution of the Work; all federal, state, county, township and municipal laws, ordinances and regulations particularly those relating to employment of labor, rates of wages, and construction methods; and all other matters which can in any way affect the Work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with the available information concerning these conditions will not relieve him from the responsibility for successfully performing the Work.
- C. Owner assumes no responsibility for any understanding or representation made during or prior to the negotiation and execution of this Contract unless such understanding or representations are expressly stated in the Contract and the Contract expressly provides that the responsibility, therefore, is assumed by the Owner.

1.07 MEASUREMENTS

- A. Base all measurements, both horizontal and vertical from established bench marks. Make all Work agree with these established lines and levels. Verify all measurements at site; and check the correctness of same as related to the Work.

1.08 LABOR AND MATERIALS

- A. Provide all materials and apparatus required for the Work of new and first-class quality. Furnish, deliver, arrange, erect, connect and finish all materials and equipment in every detail, so selected and arranged as to fit properly into the building spaces.
- B. Remove all materials delivered, or work erected, which does not comply with Drawings or Specifications, and replace with proper materials, or correct such work as directed, at no additional cost to the Owner.

1.09 COVERING OF WORK

- A. Do not cover up or hide from view any duct, piping, fitting, or other work of any kind before it has been examined or approved by the Architect/Engineer and/or other authority having jurisdiction over the same. Remove and correct immediately any unacceptable or imperfect work or unauthorized or disapproved materials discovered immediately after being disapproved.

1.10 PROTECTION

- A. Protect the Work and material of all trades from damage and replace all damaged material with new.
- B. Protect work and equipment until the Work is finally inspected, tested, and accepted; protect the Work against theft, injury or damage; and carefully store material and equipment received on site which is not immediately installed; close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.
- C. Preserve all public and private property, along and adjacent to the Work, and use every precaution necessary to prevent damage or injury thereto. Use suitable precautions to prevent damage to pipes, conduits and other underground structures or utilities, and carefully protect from disturbance or damage all property marks until an authorized agent has witnessed or otherwise referenced their location, and do not remove them until directed.

1.11 CUTTING AND PATCHING

- A. Provide all cutting and rough patching required for the Work. Perform all finish patching.
- B. Furnish and locate all sleeves and inserts required before the floors and walls are built, pay the cost of cutting and patching required for pipes where sleeves and inserts were not installed in time, or where incorrectly located. Provide all drilling required for the installation of hangers.
- C. Punch or drill all holes cut through concrete slabs or arches from the underside. Do not cut structural members without the approval of the Architect/Engineer. Perform all cutting in a manner directed by the Architect/Engineer.
- D. Do not do any cutting that may impair strength of building construction. Do not drill any holes, except for small screws, in beams or other structural members without obtaining prior approval. All Work shall be done in a neat manner by mechanics skilled in their trades and as approved.

1.12 SUBMITTALS

- A. Submit for review, shop drawings for all materials and equipment furnished and installed under this Contract. Submissions shall include but not be limited to:
 - 1. Ductwork layout drawings, air devices and accessories
 - 2. Breeching layout drawings
 - 3. Piping and equipment layout drawings.
 - 4. Piping materials, valves, hangers, supports and accessories
 - 5. Automatic temperature control equipment, diagrams and control sequences
 - 6. Equipment, fixtures, and appurtenances
 - 7. Insulation
 - 8. Rigging Plan - Include the name of the rigging company; a layout drawing that details the crane with its outriggers extended outward. Provide dimensions showing how rigging operations will affect the road and parking lines being used, the type of crane and its specification including crane arm height, lift capacity, crane reach.

- B. Reports
 - 1. Compliance with listings and approvals for equipment and for fire ratings.
 - 2. Acceptance certificates from inspecting agencies.
 - 3. Complete printed and illustrated operating instructions in report format.
 - 4. Manufacturer's performance tests of equipment.
 - 5. Field pipe and duct testing reports.
 - 6. Field operating test results for equipment.
 - 7. Performance report on the balancing of air and water systems.
 - 8. Performance reports for vibration isolation equipment.
 - 9. Manufacturer's reports on motorized equipment alignment and installation.
- C. Specific references to any article, device, product or material, fixture or item of equipment by name, make or catalog number shall be interpreted as establishing a basis of cost and a standard of quality. All devices shall be of the make and type listed by Special Agencies, such as the Underwriters' Laboratories, and where required, approved by the School District.

1.13 SPACE ALLOTMENTS AND SUBSTITUTIONS

- A. The space allotments and equipment layouts on the Drawings are based on the manufacturer's model indicated or scheduled as the "Basis of Design". Ensure that any equipment that is submitted other than the "Basis of Design" will fit in the space allotment and will provide the necessary maintenance clearances as recommended by the manufacturer. If maintenance clearances are not met, pay for any changes such that maintenance clearances will be met.
- B. Bear all costs associated with re-layout of the equipment, changes to piping/ductwork, and other changes as required if approved equipment other than the "Basis of Design" equipment is purchased. This shall also include any structural steel modifications and structural steel design changes. Submit, at no cost to the Owner, a steel design stamped by a structural engineer licensed in the state in which the Work is to be performed for structural modifications that must be made resulting from the use of equipment other than the "Basis of Design" or not specified.

1.14 PAINTING

- A. Prime paint all bare supplemental steel, supports and hangers required for the installation of Division 23 Work in accordance with "Painting" Specification Section. Touch up welds of galvanized surfaces with galvanizing primer.

1.15 MATERIAL SAFETY DATA SHEETS

- A. Submit material safety data sheets (MSDS) for all chemicals, hydraulic fluids, seal oils, lubricating oils, glycols and any other hazardous materials used in the performance of the Work, in accordance with the US Department of Labor, Occupational Safety and Health Administration (OSHA) hazard communication and right-to-know requirements stipulated in 29 CFR 1910.1200 (g).

1.16 MOTORS AND STARTERS

- A. Provide new NEMA Standard electric motors, sized and designed to operate at full load and full speed continuously without causing noise, vibration, and temperature rise in excess of their rating. Provide motors with a service factor of at least 1.15.
- B. Equip motors for belt driven equipment with rails with adjusting screws for belt tension adjustment. Weather protect motors exposed to the weather.
- C. Install high efficiency electric motors for air handling units, relief fans, and exhaust fans.

- D. Provide all motors for use with Variable Frequency Drives with “high efficiency inverter duty” insulation class “F” with class “B” temperature rise and that conform to or exceed the International Energy Conservation Code or the Federal EP Act of 1992 requirements for efficiency.
- E. Provide stainless steel nameplates, permanently attached to the motor, and having the following information as a minimum:
 - 1. Manufacturer
 - 2. Type
 - 3. Model
 - 4. Horsepower
 - 5. Service Factor
 - 6. RPM
 - 7. Voltage/Phase/Frequency
 - 8. Enclosure Type
 - 9. Frame Size
 - 10. Full-Load Current
 - 11. UL Label (where applicable)
 - 12. Lead Connection Diagram
 - 13. Bearing Data
 - 14. Efficiency at Full Load.
- F. Provide motors whose sound power levels do not exceed that recommended in NEMA MG 1-12.49.
- G. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned and balanced.
- H. Protect motor starters on equipment located outdoors in weatherproof NEMA 4X enclosures.
- I. Provide weatherproof NEMA 4X disconnect switches when located outdoors.
- J. Motor Characteristics:
 - 1. 120V/1/60 Hz, 208V/1/60 Hz or 240V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 C. continuous rise.
 - 2. 208V/3/60 Hz, 240V/3/60 Hz or 460/3/60 Hz: NEMA B, normal starting torque, single speed, squirrel-cage type, open drip-proof, rated 40 C continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.

1.17 ACOUSTICAL PERFORMANCE OF EQUIPMENT AND SYSTEMS

- A. Install the Work in such a manner that noise levels from operation of motor driven equipment, whether airborne or structure-borne, and noise levels created by or within air handling equipment and air distribution and control media, do not to exceed sound pressure levels determined by the noise criteria curves published in the ASHRAE guide.
- B. Acoustical Tests
 - 1. Owner may direct the Contractor to conduct sound tests for those areas he deems too noisy.
 - 2. If NC level exceeds the requirements of the Contract Documents due to improper installation or operation of mechanical systems, make changes or repairs to bring noise levels to within required levels.
 - 3. Retest until specified criteria have been met.

1.18 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Instructions and Demonstration for Owner's Personnel
 1. Provide operating and maintenance instruction to the Owner when project is completed and all HVAC equipment serving the building is ready to be turned over to the Owner.
 2. Turn over the HVAC equipment to the Owner only after the final testing and proper balancing of HVAC systems.
 3. Instruct the Owner's personnel in the use, operation and maintenance of all equipment of each system.
 4. The above instruction requirements are in addition to that specified for specific equipment or systems. Conform to specified requirements if more stringent or longer instruction is specified for specific equipment or systems.

1.19 CODES, RULES, PERMITS & FEES

- A. Give all necessary notices, obtain all permits and pay all government sales taxes, fees, and other costs, in connection with the Work. Unless indicated otherwise, fees for all utility connections, extensions, and tap fees for water, storm, sewer, gas, telephone, and electricity will be paid directly to utility companies and/or agencies by the Owner. File all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for the Work and deliver same to the Owner's Representative before request for acceptance and final payment for the Work.
- B. Conform to the requirements of the NFPA, NEC, FM, UL and any other local or State codes which may govern.

1.20 RECORD DRAWINGS

- A. During the progress of the Work, make a record set of drawings of all changes by which the actual installation differs from the Drawings.
- B. Create all record drawings in AutoCAD version 2013 or later in .dwg format. Upon completion of the Work, submit to the Architect/Engineer for approval three complete sets of hard copies of the record drawings, of the same size as the Drawings for approval. Upon approval by the Architect/Engineer furnish the Owner a CD copy of the record drawings along with one hard copy for his records.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 CLEANING AND ADJUSTING

- A. Cleaning
 1. Blow out, clean and flush each system of piping and equipment, to thoroughly clean the systems.
 2. Clean all materials and equipment; leave in condition ready to operate and ready to receive final finishes where required.
 3. Clean the operating equipment and systems to be dust free inside and out.
 4. Clean concealed and unoccupied areas such as plenums, pipe and duct spaces and equipment rooms to be free of rubbish and dust.
- B. Adjusting

1. Adjust and align equipment interconnected with couplings or belts.
 2. Adjust valves of all types and operating equipment of all types to provide proper operation.
 3. Clean all strainers after system cleaning and flushing and again before system startup.
- C. Lubrication
1. Lubricate equipment as recommended by the manufacturer, during temporary construction use.
 2. Provide complete lubrication just prior to acceptance.
- D. Permanent Equipment Operating During Construction
1. Use only in same service as the permanent applications.
 2. Use disposable filters during temporary operation.
 3. Replace expendable media, including belts used for temporary operation and similar materials just prior to acceptance of the Work.
 4. Repack packing in equipment operated during construction just prior to system acceptance, using materials and methods specified by the equipment manufacturer.
- E. Retouch or repaint equipment furnished with factory finish as required to provide same appearance as new.
- F. Tools
1. Provide one set of specialized or non-standard maintenance tools and devices required for servicing the installed equipment.

3.02 EQUIPMENT BASES, PLATFORMS AND SUPPORTS

- A. Provide supporting platforms, steel supports, anchor bolts, inserts, etc., for all equipment and apparatus provided.
- B. Obtain prior approval for installation method of structural steel required to frame into building structural members for the proper support of equipment, conduit, etc. Welding will be permitted only when approved by the Architect/Engineer.
- C. Submit shop drawings of supports to the Architect/Engineer for approval before fabricating or constructing.
- D. Provide leveling channels, anchor bolts, complete with nuts and washers, for all apparatus and equipment secured to concrete pads and further supply exact information and dimensions for the location of these leveling channels, anchor bolts, inserts, concrete bases and pads.
- E. Where supports are on concrete construction, take care not to weaken concrete or penetrate waterproofing.

3.03 ACCESSIBILITY

- A. Install valves, dampers and other items requiring access conveniently and accessibly located with reference to the finished building.

3.04 USE OF EQUIPMENT

- A. The use of any equipment, or any part thereof, even with the Owner's consent, is not an indication of acceptance of the Work on the part of the Owner, nor shall it be construed to obligate the Owner in any way to accept improper work or defective materials.

3.05 MODIFICATIONS OF EXISTING WORK

- A. Coordinate the Work with all other contractors and provide necessary dimensions for all openings. Provide all cuts and openings which are necessary for the Work for passage of piping and ductwork
- B. Upon completion, remove all temporary piping and equipment, shoring, scaffolds, etc., and leave all areas clean and free from material and debris resulting from the Work performed under this Section. Provide rough patching in areas required.

3.06 EQUIPMENT INSTALLATION

- A. Locate and set equipment anchor bolts, dowels and aligning devices for equipment requiring them.
- B. Level and shim the equipment; coordinate and oversee the grouting work.
- C. Perform field assembly, installation and alignment of equipment under direct supervision provided by the manufacturer or with inspections, adjustments and approval by the manufacturer.
- D. Alignment and Lubrication Certification for Motor Driven Apparatus
 - 1. After permanent installation has been made and connections have been completed, but before the equipment is continuously operated, have a qualified representative of the equipment manufacturer inspect the installation and report in writing on the manufacturer's letterhead on the following:
 - a. Whether shaft, bearing, seal, coupling, and belt drive alignment and doweling is within the manufacturer's required tolerances so that the equipment will remain aligned in the normal service intended by the Contract Documents and that no strain or distortion will occur in normal service.
 - b. That all parts of the apparatus are properly lubricated for operation.
 - c. That the installation is in accordance with manufacturer's instructions.
 - d. That suitable maintenance and operating instructions have been provided for the Owner's use.
 - e. Make any corrections to items that are required or recommended based on the manufacturer's inspection and have the equipment re-inspected.
- E. Belt Drives
 - 1. V-belt drives - a driving and driven sheave grooved for belts of trapezoidal cross-section. Construct belts of fabric and rubber so designed so as not to touch the bottom of the grooves, the power being transmitted by the contact between the belts and V-shaped groove sides. Design drives for a minimum of 150 percent of motor horsepower. Provide companion type driven sheaves.
 - 2. Select drives to provide for 12-1/2 percent variation in speed, plus or minus, from specified speed. Provide all motors with adjustable sheaves except where indicated otherwise in the Specifications or on the Drawings.
 - 3. Install all fans with adjustable pitch sheaves on their drive motors. Select sheaves to provide air quantities under specified conditions. Put air systems into operation, and determine as a result of the completed air balance the actual size of sheaves required to produce specified air quantities on installed systems. The adjustable pitch sheaves shall then be replaced with the proper size fixed sheaves. Remove adjustable pitch sheaves from premises. Provide fixed motor sheaves manufactured by Wood's.
 - 4. Where indicated on the Drawings or specified, provide spare motor, bearings, and belts.
- F. Machinery Guards

1. Protect motor drives by guards furnished by the equipment manufacturer or in accordance with the Sheet Metal and Air Conditioning Contractors National Association's Low Pressure Duct Manual. Provide guards of all types approved as acceptable under OSHA Standards.
- G. Equipment Start-up
1. Require each equipment manufacturer to provide qualified personnel to inspect and approve equipment and installation and to supervise the start-up of the equipment and to supervise the operating tests of the equipment.
 2. If a minimum number of hours for start-up and instruction are not stated with the equipment specifications, these shall be 2 full 8-hour working days as a minimum.
 3. Advise Owner of start-up at least 72 hours in advance.

3.07 CLOSEOUT PROCEDURES

- A. Field Review and Punchlist:
1. Contractor shall submit written notice of substantial completion prior to requesting 'Substantial Completion Punchlist Inspection'.
 2. Contractor shall submit all air and hydronic test balance reports a minimum of 5 days prior to requesting punchlist inspection. The reports shall be complete for all subject equipment. If any reports are missing or incomplete, contractor shall identify those items and provide a schedule of balancing completion and excepted report submission.
 3. As applicable, contractor shall provide written record of successful piping pressure test for each piping system, on company letterhead, with required data per specification, duration of test, and photographic evidence of gauge at test pressure.
 - a. The contractor shall provide a written response to the punchlist items within 2 weeks of receipt of punchlist with a schedule of completion of the open items (or commentary if discussion or objection are raised).
 4. If contractor requests a punchlist inspection and engineer finds incomplete work within the work claimed to be substantially complete, the engineer will inform the contractor and may (at engineer's choice) terminate the inspection prior to reviewing all work. The Contractor will be responsible for reimbursing engineer for subsequent punchlist activities.
 5. Upon receipt of engineer's punchlist inspection report, the contractor shall respond to each comment with an acknowledgement of each item (initialled, dated and photo evidence of completed work) or disagreement and written explanation of disagreement.
 6. The contractor may respond with acknowledgement by providing photo of corrective action, or at the engineer's choice and upon contractor's written confirmation that all punchlist items have been addressed, may request a final punchlist inspection.
- B. General Operating and Maintenance Instructions: Arrange for each installer of operating equipment and other work that requires regular or continuing maintenance, to meet at the site with the Owner's personnel to provide necessary basic instructions in the proper operation and maintenance of the entire Work. Where installers are not expert in the required procedures, include instruction by the manufacturer's representatives.
- C. Where applicable, provide instruction and training, including application of special coatings systems, at manufacturer's recommendation.
- D. Provide a detailed review of the following items:
1. Maintenance manuals
 2. Record documents and catalog cuts for each piece of equipment.
 3. Spare parts and materials
 4. Tools
 5. Lubricants
 6. Fuels
 7. Identification systems
 8. Control sequences

9. Hazards
 10. Cleaning
- E. Warranties, bonds, maintenance agreements, and similar continuing commitments.
- F. Demonstrate the following procedures:
1. Start-up
 2. Shut-down
 3. Emergency operations
 4. Noise and vibration adjustments
 5. Safety procedures
 6. Economy and efficiency adjustments
 7. Effective energy utilization.
- G. Prepare instruction periods to consist of approximately 50% classroom instruction and 50% "hands-on" instruction. Provide minimum instruction periods as follows:

Systems or Equipment	Training Time (Hours)
Condensing Units	4 hrs.
All other equipment	4 hrs. (each)

Note: Consult individual equipment specification sections for additional training requirements.

- H. Prepare a written agenda for each session and submit for review and approval. Include date, location, purpose, specific scope, proposed attendance and session duration.
- I. Record training sessions in digital format, format as selected by the Owner. Turn over digital files to the Owner after training has been completed.

END OF SECTION

SECTION 230015 - MECHANICAL DEMOLITION **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section describes the draining, disconnecting, dismantling, demolition, removal, relocation, rerouting and reconnection of existing mechanical facilities, in a neat and workmanlike manner, of mechanical systems, materials and accessories as required, as shown on the Drawings and specified herein, to accomplish alteration, restoration and to accommodate the Work.

1.02 RELATED WORK

- A. General Mechanical Requirements - Section 230010

1.03 REFERENCES

- A. ANSI A10.6 - Safety Requirements for Demolition
- B. BOCA Building Code
- C. IBC (Including State Amendments)
- D. NADC - Demolition Safety Manual
- E. NFPA Fire Code
- F. NFPA 51B - Cutting and Welding Processes
- G. NFPA 70 - National Electrical Code
- H. NFPA 241 - Safeguarding Building Construction and Demolition Operations
- I. OSHA 29 CRF 1910 - Occupational Safety and Health Standards
- J. US EPA - Clean Air Act Amendment of 1990.

1.04 SUBMITTALS

- A. Demolition Schedule
- B. Fire Watch Procedures
- C. Inspection Report of Underground Piping Systems
- D. Welding/Burning Permit - Obtain a welding/burning permit from the local Fire Official prior to the start of any welding or burning in accordance with the local Fire Code or as required by the Owner.

1.05 QUALITY ASSURANCE

- A. Only employ workers skilled in the specific trades involved for cutting, patching and removal.
- B. Job Conditions: Prior to start of the Work, make an inspection accompanied by the Architect/Engineer to determine physical condition of adjacent construction that is to remain.

1.06 SPECIAL PRECAUTIONS

- A. Do not torch cut ductwork.

SECTION 230015 - MECHANICAL DEMOLITION **H2M**

- B. Torch cutting of other mechanical equipment will be permitted only with the specific written approval of the Architect/Engineer.
- C. Include "Fire Watch" procedures as required by the Fire Code and/or Owner's Fire Insurance Carrier for any cutting work that may produce sparks. Submit fire watch procedures for approval.
- D. Perform draining operations so that damage to existing building components does not occur.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Adequately sized rubbish containers for the proper and safe disposal of all debris.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Construct temporary partitions enclosing respective work prior to any demolition work. Erect temporary fencing and signage around demolished materials.
- B. Protect existing materials and equipment which are not to be demolished.
- C. Prevent movement of structure; provide required bracing and shoring.
- D. Do not begin the work until the time schedules and manner of operations have been approved by the Architect/Engineer and Owner. Include all interruptions of existing services in schedules submitted for approval by the Architect/Engineer and Owner.

3.02 GENERAL

- A. Provide alteration and demolition of mechanical facilities as required by the Drawings and Specifications. The Drawings are diagrammatic and do not show the exact location of all existing mechanical work. Where existing equipment is to remain in service during construction, provide rerouting and reconnection of mechanical services as required to maintain continuous service.
- B. Review all equipment with the Architect/Engineer and Owner prior to disposal. Completely remove existing ductwork, piping, conduit and similar items to be abandoned that are not embedded in walls or floor slabs unless otherwise shown on the Drawings. Cap open ends at all walls and floors.
- C. Remove, store and protect all equipment or materials designated to be turned over to the Owner. Coordinate exact location of storage with the Owner.
- D. Temporarily cap ends of ductwork, piping and sanitary vent piping to avoid entry of dirt, debris, or discharge of foul odors and gases.
- E. Where existing louvers or ductwork penetrations are to remain, blank-off the opening on the inside with galvanized sheet metal on both sides of 2-inch thick, 6 pcf density rigid fiberglass board insulation. Paint side attached to the opening with weather resistant flat black paint.
- F. Do not close or obstruct egress width to exits.

SECTION 230015 - MECHANICAL DEMOLITION **H2M**

- G. Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to the Architect/Engineer and Owner.
- H. Conform to procedures applicable when discovering hazardous or contaminated materials.
- I. Conduct demolition to minimize interference with adjacent building structures or Owner's operations.
- J. Cease operations immediately if structure appears to be in danger or hazardous materials are encountered. Notify Architect/Engineer. Do not resume operations until directed.
- K. Demolish in an orderly and careful manner. Do not cut or remove more than is necessary to accommodate the new construction or alteration.
- L. Remove demolished materials from site daily. Do not burn or bury materials on site. Dispose of all material at an approved disposal facility.
- M. Protect finished surfaces at all times and repair or replace, if damaged, to match existing construction to the satisfaction of the Architect/Engineer.

3.03 PIPING REMOVAL

- A. Cut off all welded piping square at the locations indicated on the Drawings. No cutting is required where the demolition ends at a flanged valve or equipment. Close off all openings of any remaining valves, piping or fittings with weld caps or blind flanges to prevent debris from entering the existing system.
- B. Disconnect all threaded piping at the location indicated on the Drawings. Close off all openings of remaining valves, piping, fittings and equipment with pipe plugs or pipe caps as required to prevent debris from entering the existing systems.
- C. Remove all pipe hangers, supports, miscellaneous steel and anchors with the piping.

3.04 PROTECTION FROM FREEZING

- A. It is intended that the building remain protected from damage due to freezing temperatures. To that end, keep in place and in operation existing equipment and systems used for heating until scheduling permits shutdown.
- B. Where the removal of equipment, etc. will leave an area unprotected from freezing, notify the Owner and Architect/Engineer at least 72 hours in advance prior to removal so appropriate steps can be taken by the Owner to protect the area. Provide temporary heating equipment sufficient to prevent freezing.
- C. It is the Contractor's responsibility to ensure that piping systems that are being worked on are completely drained from water prior to the start of demolition. If water is not drained and the water freezes it is the Contractor's responsibility to replace piping and repair all damages caused by water leakage at his own expense.

3.05 DISCONNECTION AND INTERRUPTION OF MECHANICAL SERVICES

- A. When portions of an existing piping system or ductwork system are removed, and this removal causes loss of operation to another piece of equipment due to open or disconnected piping or ductwork, cap piping or ductwork or provide temporary piping or ductwork system to retain operation of the system.

SECTION 230015 - MECHANICAL DEMOLITION **H2M**

3.06 MECHANICAL EQUIPMENT REMOVAL

- A. Remove all mechanical equipment as shown on the Drawings. Remove all electrical work, including wiring between equipment, and wiring to power source or point of origin.
- B. Where equipment is supported by steel and/or structural supports, remove these supports.

3.07 REFRIGERANT REMOVAL

- A. Recover and dispose of all existing refrigerant charges in accordance with EPA regulations. Comply with all regulations applicable to the release of chlorofluorocarbon refrigerants to the atmosphere.

3.08 DUCTWORK REMOVAL

- A. Disconnect all ductwork which must be removed, at the closest joint and support the remaining ductwork.
- B. Prepare all remaining ductwork joints at the point of disconnection to receive new ducts or blank-off panels.
- C. Remove all ductwork supports and miscellaneous steel with ductwork to be demolished.

3.09 INSULATION REMOVAL

- A. Remove insulation, together with all piping, fittings, valves and equipment designated for demolition.

3.10 CONTROL WIRING REMOVAL

- A. Disconnect and remove all control wiring and tubing, including conduit, for the Automatic Temperature Control (ATC) System associated with equipment and systems to be removed.

3.11 CONCRETE HOUSEKEEPING PAD REMOVALS

- A. Unless noted otherwise on drawings, remove existing concrete housekeeping pads remaining unused as a result of equipment removals.
 - 1. Remove or cut dowels down flush to existing MER floor elevation to eliminate trip hazard.
 - 2. Grind down high points to be level with existing MER floor.
 - 3. Patch area of pad removal with concrete patch as required to fill in all holes and low points, and provide trowel smooth finish.
 - 4. If section of existing pad to remain, saw cut straight edge and grind a minimum 1/4" chamfer on sharp corners of existing pad edges to remain.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The Work covered under this Section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the pipe hanger and supports as described in this Specification. Size hangers and supports to fit the outside diameter of the piping.

1.02 REFERENCES

- A. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- B. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
- C. ASTM A653 - Specification for Steel Sheet, Zinc-Coated by the Hot-Dip Process
- D. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)
- E. MSS SP58 - Manufacturers Standardization Society: Pipe Hangers and Supports- Materials, Design, and Manufacture
- F. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

1.03 QUALITY ASSURANCE

- A. Provide hangers and supports used in fire protection piping systems listed and labeled by Underwriters Laboratories.
- B. Steel pipe hangers and supports shall have the manufacturer's name, part number, and applicable size stamped in the part itself for identification.
- C. Design and manufacture hangers and supports in conformance with MSS SP 58.

1.04 SUBMITTALS

- A. Submit product data on all hanger and support devices, including shields and attachment methods. Include as a minimum as part of product data materials, finishes, approvals, load ratings, and dimensional information.
- B. Submit Pipe Hanger and Support Application Schedule.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with these specifications, provide pipe hanger and support systems manufactured by:
 - 1. Cooper B-Line, Inc.
 - 2. Carpenter and Patterson
 - 3. Grinnell

2.02 PIPE HANGERS AND SUPPORTS

A. Hangers

1. Uninsulated pipes 2 inch and smaller:
 - a. Adjustable steel swivel ring (band type) hanger, B-Line B3170.
 - b. Adjustable steel swivel J-hanger, B-Line B3690.
 - c. Malleable iron ring hanger, B-Line B3198R or hinged ring hanger, B3198H.
 - d. Malleable iron split-ring hanger with eye socket, B-Line B3173 with B3222.
 - e. Adjustable steel clevis hanger, B-Line B3104 or B3100.
2. Uninsulated pipes 2-1/2 inch and larger: ha
 - a. Adjustable steel clevis hanger, B-Line B3100.
 - b. Pipe roll with sockets, B-Line B3114.
 - c. Adjustable steel yoke pipe roll, B-Line B3110.
3. Insulated pipe- Hot or steam piping:
 - a. 2 inch and smaller pipes: use adjustable steel clevis with galvanized sheet metal shield. B-Line B3100 with B3151 series.
 - b. 2-1/2 inch and larger pipes
 - 1) Adjustable steel yoke pipe roll with pipe covering protection saddle. B-Line B3110 with B3160-B3165 series.
 - 2) Pipe roll with sockets with pipe covering protection saddle, B-Line B3114 with B3160-B3165 series.
4. Insulated pipe- Cold or chilled water piping:
 - a. 5 inch and smaller pipes: use adjustable steel clevis with galvanized sheet metal shield. B-Line B3100 with B3151 series.
 - b. 6 inch and larger pipes:
 - 1) Pipe roll with sockets with pipe covering protection saddle, B-Line B3114 with B3160-B3165 series.
 - 2) Adjustable steel yoke pipe roll with pipe covering protection saddle. B-Line B3110 with B3160-B3165 series.

B. Pipe Clamps

1. When flexibility in the hanger assembly is required due to horizontal movement, use pipe clamps with weldless eye nuts, B-Line B3140 or B3142 with B3200. For insulated lines use double bolted pipe clamps, B-Line B3144 or B3146 with B3200.

C. Multiple or Trapeze Hanger

1. Construct trapeze hangers from 12 gauge roll formed ASTM A1011 SS Grade 33 structural steel channel, 1-5/8 inch by 1-5/8 inch minimum, B-Line B22 strut or stronger as required.
2. Mount pipes to trapeze with 2 piece pipe straps sized for outside diameter of pipe, B-Line B2000 Series.
3. For pipes subjected to axial movement:
 - a. Strut mounted roller support, B-Line B3126. Use pipe protection shield or saddles on insulated lines.
 - b. Strut mounted pipe guide, B-Line B2417.

D. Wall Supports

1. Pipes 4 inch and smaller:
 - a. Carbon steel hook, B-Line B3191.
 - b. Carbon steel J-hanger, B-Line B3690.
2. Pipes larger than 4 inch:
 - a. Welded strut bracket and pipe straps, B-Line B3064 and B2000 series.

- b. Welded steel brackets, B-Line B3066 or B3067, with roller chair or adjustable steel yoke pipe roll. B-Line B3120 or B3110. Use pipe protection shield or saddles on insulated lines.
- E. Floor Supports
 - 1. Hot piping under 6 inch and all cold piping:
 - a. Carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. B-Line B3093 and B3088T or B3090 and B3088. Screw or weld pipe saddle to appropriate base stand.
 - 2. Hot piping 6 inch and larger:
 - a. Adjustable Roller stand with base plate, B-Line B3117SL
 - b. Adjustable roller support and steel support sized for elevation, B-Line B3124
- F. Vertical Supports
 - 1. Steel riser clamp sized to fit outside diameter of pipe, B-Line B3373.
 - 2. Copper Tubing Supports
 - a. Size hangers to fit copper tubing outside diameters.
 - 1) Adjustable steel swivel ring (band type) hanger, B-Line B3170CT.
 - 2) Malleable iron ring hanger, B-Line B3198RCT or hinged ring hanger B3198HCT.
 - 3) Malleable iron split-ring hanger with eye socket, B-Line B3173CT with B3222.
 - 4) Adjustable steel clevis hanger, B-Line B3104CT.
 - b. For supporting vertical runs use epoxy painted or plastic coated riser clamps, B-Line B3373CT or B3373CTC.
 - c. For supporting copper tube to strut use epoxy painted pipe straps sized for copper tubing, B-Line B2000 series, or plastic inserted vibration isolation clamps, B-Line BVT series.
- G. Plastic Pipe Supports
 - 1. V-Bottom clevis hanger with galvanized 18-gauge continuous support channel, B-Line B3106 and B3106V, to form a continuous support system for plastic pipe or flexible tubing.
 - 2. Supplementary Structural Supports
 - a. Design and fabricate supports using structural quality steel bolted framing materials as manufactured by Cooper B-Line. Provide roll formed channels, 12 gauge ASTM A1011 SS Grade 33 steel, 1-5/8 inch by 1-5/8 inch or greater as required by loading conditions. Submit designs for pipe tunnels, pipe galleries, etc., to Architect/Engineer for approval. Use clamps and fittings designed for use with the strut system.
- H. Pipe Supports Between Anchors and Pipe Expansion Loops
 - 1. Provide supports between pipe anchors designed to cause minimal resistance to piping movement. Provide roller hanger supports or slide plates between anchors.
 - 2. Provide supports near the L bends of pipe thermal expansion loops. No more than 12 inches from either side of the horizontal elbow.

2.03 SPRING HANGERS

- A. For critical high temperature piping, at hanger locations where the vertical movement of the piping is $\frac{3}{4}$ inch or more, or where it is necessary to avoid the transfer of load to adjacent hangers or connected equipment, provide approved constant support hangers. However, where the piping movement occurs at a hanger supporting a portion of piping riser on which a rigid support is also located, variable spring hangers may be used for any amount of expansion up to the full recommended working range of the spring, provided the change in supporting effect of the variable spring is added to the design load of the rigid support.
- B. Where transfer of load to adjacent hangers or equipment is not critical, and where the vertical movement of the piping is less than $\frac{3}{4}$ inch, variable spring hangers may be used, provided the

variation in supporting effect does not exceed 25 percent of the calculated piping load through its total vertical travel.

- C. The total travel for constant support hangers shall be equal to actual travel plus 20 percent. In no case shall the difference between actual and total travel be less than one inch.
- D. Furnish constant support hangers with travel stops, which shall prevent upward and downward movement of the hanger. The travel stops shall be factory installed so that the hanger level is at the "cold" position. Design the travel stops to permit future re-engagement, even in the event the lever is at a position other than "cold", without having to make hanger adjustments.
- E. For low temperature systems where vertical movements are anticipated, use approved precompressed variable spring hangers.

2.04 UPPER ATTACHMENTS

- A. Beam Clamps
 - 1. Use beam clamps where piping is to be suspended from building steel. Select clamp type on the basis of load to be supported, and load configuration.
 - 2. Use center loaded beam clamps where specified. For steel clamps provide B-Line B3050, or B3055. For malleable iron or forged steel beam clamps with cross bolt provide B-Line B3054 or B3291-B3297 Series as required to fit beams.
- B. Concrete Inserts
 - 1. Use cast in place spot concrete inserts where applicable; either steel or malleable iron body, B-Line B2500 or B3014. Select spot inserts to allow for lateral adjustment and to have means for attachment to forms. Select inserts to suit threaded hanger rod sizes, B-Line N2500 or B3014N series.
 - 2. Use continuous concrete inserts where applicable. Provide 12 gauge channels, ASTM A1011 SS Grade 33 structural quality carbon steel, complete with Styrofoam inserts and end caps with nail holes for attachment to forms. Provide continuous concrete inserts with a load rating of 2,000 lbs/ft. in concrete, B-Line B22I, 32I, or 52I. Select channel nuts suitable for strut and rod sizes.
 - 3. Provide Drop-In, shell type anchors with an internally threaded, all-steel shell with expansion cone insert and flush embedment lip. Manufacture anchors from plated carbon steel, 18-8 stainless steel and 316 stainless steel. Install anchors with carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994 specifications. Test anchors to ASTM E488 criteria and listed by ICC (formerly ICBO) and SBCCI. Provide anchors listed by the following agencies as required by the local building code: UL, FM. Select inserts to suit threaded hanger rod sizes, Redhead Multi-Set.

2.05 ACCESSORIES

- A. Hanger Rods shall be threaded both ends or continuous threaded rods of circular cross section. Use adjusting locknuts at upper attachments and hangers. No wire, chain, or perforated straps are allowed.
- B. Provide shields that are 180 degree galvanized sheet metal, 12 inch minimum length, 18 gauge minimum thickness, designed to match outside diameter of the insulated pipe, B-Line B3151.
- C. Pipe protection saddles shall be formed from carbon steel, 1/8 inch minimum thickness, sized for insulation thickness. Saddles for pipe sizes greater than 12 inch shall have a center support rib.

2.06 FINISHES

A. Indoor Finishes

1. Coat hangers and clamps for support of bare copper piping with copper colored epoxy paint, B-Line Dura-Copper®. Use additional PVC coating of the epoxy painted hanger where necessary.
2. Zinc plate hangers for other than bare copper pipe in accordance with ASTM B633 OR provide an electro-deposited green epoxy finish, B-Line Dura-Green®.
3. Provide pre-galvanized strut channels in accordance with ASTM A653 SS Grade 33 G90 or provide an electro-deposited green epoxy finish, B-Line Dura-Green®.

B. Outdoor and Corrosive Area Finishes

1. Hot dip galvanize hangers and struts located outdoors after fabrication in accordance with ASTM A123. Provide all hanger hardware as hot dip galvanized or stainless steel. Zinc plated hardware is not acceptable for outdoor or corrosive use.
2. Provide hangers and strut manufactured of type 304 stainless steel with stainless steel hardware where located in corrosive areas.

PART 3 - EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

- A. Adequately support pipe by pipe hanger and supports specified in PART 2 PRODUCTS. Allow for forces imposed by expansion joints, satisfy structural requirements and maintain proper clearances with respect to adjacent piping, equipment and structures. Size hangers for insulated pipes sized to accommodate insulation thickness.
- B. Keep the different types of hangers to a minimum and provide hangers that are neat, without complicated bolting and with the number of parts of each hanger and its anchor kept to a minimum.
- C. Make accurate weight balance calculations to determine the required supporting forces at each hanger or support location and the pipe weight load at each equipment connection.
- D. Provide pipe hangers capable of supporting the pipe in all conditions of operation selected to allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.
- E. Painted or shop prime all hangers and supports that are not galvanized.
- F. Support horizontal steel piping in accordance with MSS SP-58 and NYS 2020 Mechanical Code, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 1-1/4	3/8	7
1-1/2	3/8	9
2	3/8	10
2-1/2	1/2	11
3	1/2	12
3-1/2	1/2	12
4	5/8	12
5	5/8	12
6	3/4	12

8	3/4	12
10	7/8	12
12	7/8	12
14	1	12
16	1	12

- G. Support horizontal copper tubing in accordance with MSS SP-58 and NYS 2020 Mechanical Code, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 3/4	3/8	5
1	3/8	6
1-1/4	3/8	7
1-1/2	3/8	8
2	3/8	8
2-1/2	1/2	9
3	1/2	10
3-1/2	1/2	11
4	1/2	12
5	1/2	12
6	5/8	12
8	3/4	12

- H. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non adhesive isolation tape- B-Line Iso-pipe. Galvanized felt isolators sized for copper tubing may also be used, B-Line B3195CT.
- I. Install hangers to provide a minimum of 1/2 inch space between finished covering and adjacent work.
- J. Place a hanger within 12 inches of each horizontal elbow.
- K. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.
- L. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified in section 2.02 C. Space trapeze hangers according to the smallest pipe size, or install intermediate supports according to schedules in this Section.
- M. Do not support piping from other pipes, ductwork or other equipment that is not building structure.
- N. Where horizontal piping movements are greater than 1/2 inch, or where the hanger rod angularity from the vertical is greater than four degrees from the cold to hot position of the pipe, offset the hanger pipe and structural attachments in such a manner that the rod is vertical in the hot position.
- O. In any part of the building which is steel-framed, attach hangers to the building structural steel beams. Where hangers do not correspond with the building structural steel beams, provide supplemental steel members continuously welded or bolted to the building structural steel beams. Provide two (2) coats of primer on the supplemental steel. In any parts of the building

which is a concrete structure, attach hangers to the concrete structure by installing anchors into the concrete.

3.02 CONCRETE INSERTS

- A. Secure pipe hangers attached to concrete structure and slabs with embedded inserts, anchor bolts or concrete fasteners. Use a safety factor of 5 in selection of all inserts and expansion bolts unless there are seismic requirements (See "Seismic Restraint" specification if applicable). In which case, the larger of the two loadings shall govern the design.
- B. Provide inserts for placement in formwork before concrete is poured.
- C. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- D. Where concrete slabs form finished ceilings, provide inserts to be flush with slab surface.
- E. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section describes the marking and identification materials for identifying mechanical equipment, ductwork and piping systems.
- B. Mark and identify all mechanical equipment, ductwork and piping systems described herein, and as shown and specified in the Contract Documents.

1.02 REFERENCES

- A. ANSI A13.1 - Scheme for the Identification of Piping Systems.
- B. Z53.1 - Safety Color Code for Marking Physical Hazards.
- C. OSHA 29 CFR 1910 - Subpart J, General Environmental Controls

1.03 SUBMITTALS

- A. Identification Scheme - Submit scheme of identification codes.
- B. Steam Trap Schedule - Submit steam trap schedules listing proposed steam trap number, location, type, sizes and service.
- C. Valve Schedules - Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Samples - Submit samples of tags, attachments, labeled and identified.
- E. Equipment Schedules - Submit mechanical equipment schedules, listing proposed equipment numbers, and their location and function.
- F. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

- A. Seton
- B. Bunting
- C. W.H. Brady Company

2.02 VALVE TAGS

- A. Provide valve tags for all valves installed for this project. Valve tags shall be constructed of brass with stamped letters and service designation tag size minimum 1-1/2 inches (38 mm) diameter with smooth edges, brass S hook.
- B. Valve tags shall be permanently stamped and marked with a service designation, normal valve position, and an identifying number as large as possible. Each valve shall have a separate and distinct number coordinated with the service designations shown on the Drawings and the Owners existing valve numbering system. Coordinate with the Architect and Owner before finalizing the valve tag numbering system.

2.03 STEAM TRAP TAGS

- A. Provide steam trap tags for all steam traps installed for this project. Steam trap tags shall be constructed of brass with stamped letters and service designation tag size minimum 1-1/2 inches (38 mm) diameter with smooth edges, brass S hook.
- B. Each steam trap tag shall be permanently stamped and marked with a service designation and a unique identifying number as large as possible.
- C. Each trap shall have a separate and distinct number coordinated with the service designations shown on the Drawings and the Owners existing trap numbering system. Coordinate with the Architect/Engineer and Owner before finalizing the trap tag numbering system.

2.04 PIPE MARKERS

- A. All accessible piping installed indoors for this project, insulated and uninsulated shall be identified with wraparound pipe markers. Pipe markers shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. "Accessible" piping shall include exposed piping, and piping located above lay-in ceilings. Markers shall include system name, flow arrow, and color code and pipe diameter.
- B. All piping installed outdoors for this project, insulated and uninsulated, shall be identified with wraparound pipe markers. Pipe markers shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. The marker shall be printed with weather-resistant ink.
- C. Where pipes are too small or not readily accessible for application of pipe markers, a brass identification tag at least 1 ½ inches in diameter, with depressed ½ inch high black letters and numerals, shall be securely fastened at locations specified for pipe markers.
- D. See pipe marker schedule for size requirements of pipe markers.

2.05 MECHANICAL EQUIPMENT MARKERS

- A. Identify all mechanical equipment, bare or insulated, installed in the rooms or on the roof, by means of lettered and numbered nameplate (not stenciled) identifying the equipment and service. Refer to the Drawings for equipment identifications. Nameplates shall be aluminum with permanent 1 ½ inch high white letters on a black background, mechanically affixed and installed in a readily visible location on the equipment. Coordinate the final equipment designation with the Owner.
- B. In addition to markers, all mechanical equipment shall be furnished with the manufacturer's identification plate showing the name of equipment, manufacturer's name and address, date of purchase, model number and performance data.

2.06 DUCT WORK IDENTIFICATION

- A. Provide full air distribution system identification at each side of a wall penetration, in a mechanical room, at all changes in direction and at no more than 50 foot intervals. Provide arrows identifying direction of flow.
- B. Fire damper or Smoke damper access points shall be permanently identified on the exterior by a label having letters not less than 0.5 inch in height reading: SMOKE DAMPER or FIRE DAMPER.
- C. Identification shall be preprinted labels.

- D. Letter Size: 1-1/2 inches in height.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Apply piping system markers and valve tags in the following locations:
1. Adjacent to each valve and fitting.
 2. At each branch location and riser take-off
 3. At each side of a pipe passage through floors, walls, ceiling and partitions.
 4. At each pipe passage to and from underground areas.
 5. Every 20 feet on all horizontal and vertical pipe runs.
- B. Provide arrow markers showing direction of flow incorporated into or adjacent to each piping system marker. Use double-headed arrows if flow is in both directions.
- C. Apply all piping system markers where view is unobstructed; markers and legends shall be clearly visible from operating positions.
- D. Apply all tags and piping system markers in accordance with the manufacturer's instructions. Do not attach tags to valve handle such that the normal or emergency operation of the valve will be hindered.

3.02 VALVE CHART

- A. Provide valve and steam trap chart identifying each valve's and steam trap's number, size of valve and service.
- B. Frame the chart and locate the schedule in the Mechanical Equipment Room. (Aluminum Frame with plastic window).
- C. Provide a compact disc that has the valve and steam trap chart schedule in a spreadsheet format. The spreadsheet software to be used for the schedule shall be identified by the Owner.

3.03 LAY IN CEILING TILES AND ACCESS DOORS

- A. Provide a lettered and numbered nameplate for each access door indicating the mechanical equipment that the door provides access too.
- B. Where VAV boxes, hot water reheat coils, or other mechanical devices are installed above a lay-in ceiling tile system, provide and install color coded thumb tabs to mark the location of the equipment above the ceiling.

3.04 SCHEDULES

- A. Pipe Marker Letter Size Schedule:

Outside diameter of insulation or pipe Inches	Letter height Inches	Color field Inches
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1 - 1/4	12
8 to 10	2 - 1/2	24
Over 10	3 - 1/2	24

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This section specifies requirements for testing, adjusting, and balancing of all air distribution systems, including the equipment and devices associated with each system.
- B. The work includes setting speed and flow, adjusting equipment and devices installed for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to the mechanical installations specified in other Sections of the Specifications.

1.02 RELATED WORK

- A. Drawings and general provisions of the Contract, including General Conditions, any Supplemental Conditions and Division 01 Specification Sections, govern the work of this section.

1.03 SUBMITTALS

- A. Submit proof that the testing, adjusting and balancing agency meets the requirements of Article 1.04 "Quality Assurance" below, and all other specified requirements.
- B. Prior to performing the work, submit sample blank forms of the test reports that will be submitted by the entity performing work of this Section, indicating all data and parameters included.
- C. Submit certified test reports, signed by the authorized representative of the testing and balancing agency. Certify the reports to be proof that the systems have been tested, adjusted and balanced in accordance with the selected reference standards (NEBB or AABC); are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at completion of the testing, adjusting and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Submittal of test report shall be in the following format:
 - 1. Draft Report: Upon completion of testing, adjusting and balancing procedures, prepare draft reports on the approved forms. Draft report may be handwritten, but must be complete, factual, accurate and legible. Organize and format draft reports in the same manner specified herein for the final reports. Submit digital (PDF) of draft reports.
 - 2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written and organized and formatted as described herein. Submit digital (PDF) of final reports.
 - a. Report Format: Submit reports using the standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted and balanced. Include schematic systems diagrams. Divide the contents into the below listed divisions, separating them by divider pages with titles descriptive of the contents:
 - 1) General Information and Summary.
 - 2) Air Systems.
 - b. Report Contents: Provide the following minimum information, forms and data:
 - 1) General Information and Summary: Identify the testing, adjusting and balancing Agency, Contractor, Owner, Architect/Engineer, and Project on the inside cover sheet. Include addresses, and contact names and telephone numbers. Include a certification sheet containing the seal and name, address, telephone number and signature of the Agency's responsible certified Test and Balance Engineer. Include in this division a listing of the instrumentation used for the procedures, along with the proof of calibrations.

- 2) Include in the remainder of the reports the appropriate forms containing, as a minimum, the information indicated on the standard report forms prepared by AABC or NEBB, for each item of equipment and system. Prepare a schematic diagram for each item of equipment and system, to accompany each respective report form.
- c. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards within a period not exceeding six months prior to conducting the test procedures.
- d. Existing Systems: Where existing systems are to be added to or modified include in the report results of operational tests taken prior to modifications including but not limited to existing fan curves, pressure readings and flow measurements. Include in the report copies of the equipment and motor nameplate data along with equipment performance curves indicating operating points prior to any modifications and, where existing equipment is retained, operating points after system balance. Where terminals are adjusted or modified include terminal performance curves/data and final readings.

1.04 QUALITY ASSURANCE

- A. Test, adjust and balance systems and equipment by using competent mechanics regularly employed by a testing, adjusting and balancing Subcontractor whose primary business is the testing, adjusting and balancing of building mechanical systems. The testing, adjusting and balancing Subcontractor shall be a business established for a minimum of 10 years.
- B. The testing, adjusting, and balancing Subcontractor shall be certified by the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB).
- C. Instrumentation type, quantity, and accuracy shall be as described in AABC's "National Standards for Field Measurement and Instrumentation, or Total System Balance, or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
- D. All instrumentation shall be calibrated at least every 6 months or more frequently if required by the instrument manufacturer.

1.05 PERFORMANCE REQUIREMENTS

- A. Comply with all applicable Federal, State and Local laws, ordinances, regulations and codes, and the latest industry standards including, but not limited to the entities listed below for procedures, measurements, instruments and test reports for testing, adjusting and balancing work:
 1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
 2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 3. National Environmental Balancing Bureau (NEBB)
 4. Associated Air Balance Council (AABC)
- B. Set the air delivery or intake of each diffuser, grille and register to be as designed or within five percent of the air flow rates shown on the Drawings.
- C. Set the fan air flow rate and static pressure rise across the fan to be within 10 percent above the design value at design speed.

1.06 JOB CONDITIONS

- A. Require the testing and balancing specialist to review his/her work with the respective manufacturers of the equipment and devices involved, and coordinate and schedule all work.

- B. Furnish and install balancing dampers, pressure taps, gauges, and other components as required for a properly balanced system, whether or not specified herein or shown on the Drawings, all at no additional cost to the Owner. Make all adjustment or replacement parts recommended by the testing and balancing specialist in strict accordance with the respective equipment manufacturer's recommendations.
- C. Coordinate with the control manufacturer's representative to set the adjustment of the automatically operated dampers to operate as required.

1.07 GENERAL

- A. The Owner will occupy the building during the entire testing, adjusting, and balancing period. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.
- B. Complete all tests specified herein to the satisfaction of the Architect before final acceptance.
- C. The Architect, or his representative, is the sole judge of the acceptability of the tests. The Architect may direct the performance of any such additional tests, as he deems necessary in order to determine the acceptability of the systems, equipment, material and workmanship. No additional payment will be made for any test required by the Architect.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
- B. Obtain copies of approved shop drawings of all air handling equipment, air outlets (supply, return and exhaust), and the temperature control diagrams, including intended sequence of operations.
- C. Existing Systems: Where existing systems are to be added to or modified perform operational tests prior to modifications including but not limited to existing fan curves, pressure readings and flow measurements.
 - 1. Obtain copies of the equipment and motor nameplate data along with equipment performance curves indicating operating points prior to any modifications. Where terminal units are to be adjusted or modified obtain performance data for these units.
- D. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned, and is operable. Do not proceed with testing, adjusting and balancing until unsatisfactory conditions have been corrected in a manner approved by the testing and balancing specialist.
- E. Examine the air systems to see that they are free from obstructions. Determine that all dampers and registers are open, moving equipment is lubricated, clean filters are installed, and automatic controls are functioning; and perform other inspections and maintenance activities necessary for proper operation of the systems.

- F. Where existing systems are to be modified or added to ensure that all filters are clean and any operational problems that will prevent system balance have been brought to the attention of the Owner and repaired.

3.02 TESTING, ADJUSTING AND BALANCING

- A. Notify the Owner 48 hours in advance of starting any tests. Do not perform any tests until acknowledgment of notification and approval has been received from the Owner.
- B. Provide all necessary instruments and personnel for the tests. If, in the opinion of the Architect/Engineer, the results of such tests show that the Work has not complied with the requirements of the Contract Documents, make all additions or changes necessary to put the system in proper working condition and pay all expenses for all subsequent tests which are necessary to determine whether the Work is satisfactory. Any additional work or subsequent tests shall be carried out at the convenience of the Architect/Engineer.
- C. Test all packaged equipment in strict accordance with the equipment manufacturer's requirements.
- D. Perform any and all other tests that may be required by the local municipality or other governing body, board or agency having jurisdiction.
- E. Perform testing, adjusting, and balancing after leakage and pressure tests on air distribution systems have been satisfactorily completed.
- F. Actuate all safety devices in a manner that clearly demonstrates their workability and operation.
- G. Cut insulation and ductwork for installation of test probes to the minimum extent necessary to allow adequate performance of test procedure.
- H. Perform tests and compile test data for all air systems.
- I. Include a schematic diagram locating the air inlets, outlets, fans, equipment, dampers and regulating devices for air systems.
- J. All instruments used shall be provided by the entity performing the Work of this Section, and shall be accurately calibrated and maintained in good working order.
- K. Air Systems
- L. Perform the testing, adjusting and balancing of air systems in accordance with the detailed procedures outlined in the referenced standards; including but not be limited to the following:
 - 1. Test, record and adjust fan rpm to design requirements.
 - 2. Test and record motor full load amperes.
 - 3. Make a pitot tube traverse of main supply ducts and obtain design flow rate at fans.
 - 4. Test and record system static pressure, velocity pressure and total pressure.
 - 5. Test and adjust system for design supply, transfer and return air flow rate.
 - 6. Test and adjust system for minimum and maximum design flow rates of outside air.
 - 7. Test and record return air temperatures.
 - 8. Test and record coil and fan leaving air temperatures.
 - 9. Adjust all main supply, return, relief, and exhaust air ducts to proper design flow rate.
 - 10. Adjust all zones to proper design flow rate for supply, return, transfer, relief and exhaust air.
 - 11. Test and adjust each diffuser, grille and register.
 - 12. Identify each grille, diffuser and register as to location and area on the schematic diagram.

13. Identify and list in the final report size, type and manufacturer of diffusers, grilles and registers and all tested equipment. Use manufacturer's data on all equipment to make required calculations for testing, adjusting and balancing. Include design required velocity and test resultant velocity, required flow rate and test resultant flow rate after adjustment as part of readings and tests of diffusers, grilles and registers.
14. Adjust all diffusers, grilles and registers to minimize drafts in all areas.
15. Permanently mark all dampers after air balance is complete so that they can be restored to their correct position, if disturbed later.
16. Seal openings in ductwork for pitot tube insertion with snap-in plugs after air balance is complete.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This section describes the insulation, jackets and accessories for piping as scheduled in Part 3 of this Section and as shown on the Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 078413 - Through Penetration Firestopping for HVAC Systems
- B. Section 079201 - Non Fire Rated Sleeves and Seals
- C. Section 232000 - Pipe, Valves, and Fittings
- D. Section 232300 - Refrigerant Piping

1.03 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 255 - Surface Burning Characteristics of Building Materials.
- B. New York:
 - 1. International Energy Conservation Code - 2018
 - 2. International Mechanical Code - 2018
 - 3. Mechanical Code of New York State - 2020
 - 4. Energy Conservation Construction Code - 2020
 - 5. ASHRAE 90.1 - 2016
- C. Greenguard
- D. Underwriters Laboratories, Inc. (UL):
 - 1. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.
- E. American Society for Testing and Materials (ASTM):
 - 1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 3. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
 - 5. ASTM C335 - Standard Test Method for Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
 - 6. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - 7. ASTM C518 - Standard Test Method for Steady-State Heat Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 8. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
 - 9. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - 10. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation.
 - 11. ASTM C 552 - Standard Specification for Cellular Glass Thermal Insulation
 - 12. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 13. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

14. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing.
15. ASTM C 591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
16. ASTM C 610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation.
17. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
18. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
19. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
20. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
21. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
22. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
23. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials.

1.04 DEFINITIONS

- A. Greenguard: Greenguard Environmental Institute
- B. IAQ: Indoor Air Quality
- C. EPA: Environmental Protection Agency.
- D. WHO: World Health Organization
- E. ASJ: All Service Jacket
- F. SSL: Self-Sealing Lap
- G. FSK: Foil-Scrim-Kraft; jacketing
- H. PSK: Poly-Scrim-Kraft; jacketing
- I. PVC: Polyvinyl Chloride
- J. FRP: Fiberglass Reinforced Plastic
- K. Cold Service Piping/ Surfaces: Pipes or surfaces where the normal operating temperature is 60 degrees F or lower.
- L. Hot Service Piping/ Surfaces: Pipes or surfaces where the normal operating temperature is 105 degrees F or higher.

1.05 SUBMITTALS

- A. Product data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing products specified with minimum 3 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.
- B. Materials:
 - 1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
 - 2. Insulation for duct, pipe and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1" thickness in less than 53 seconds when tested in accordance with ASTM D1692.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- B. Follow manufacturer's recommended storage and handling practices.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient conditions required by manufacturers of each product (tapes, adhesives, mastics, cements, insulation, etc.).
- B. Maintain temperature before, during, and after installation for a minimum of 24 hours.
- C. Supply fiberglass products that assure excellent IAQ (Indoor Air Quality) performance through Greenguard Certification.
- D. Mold: Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold growth remove it from the Site. If the material is wet but shows no sign of mold, dry rapidly and thoroughly. If it shows signs of facing degradation from wetting remove it from the Site.

PART 2 - PRODUCTS

2.01 FIBER GLASS INSULATION

- A. Approved Manufacturers:
 - 1. Knauf Insulation
 - 2. Johns Manville Corporation
 - 3. Owens Corning Corporation
 - 4. CertainTeed Corporation
- B. Fiber glass insulation meeting ASTM C547, ASTM C585, and ASTM C795; rigid molded, noncombustible.
- C. Factory applied vapor barrier jacket: ASJ/SSL conforming to ASTM C1136 Type I and ASTM E96, secured with self-sealing longitudinal laps and butt strips.

2.02 FIBER GLASS INSULATION JACKETS AND ACCESSORIES

- A. Field-Applied Jackets and Fitting Covers

1. PVC - 25/50 or Indoor/Outdoor, UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system consisting of pre-molded, high-impact PVC materials with fiber glass inserts. Approved Manufacturer: Proto Corporation.
 - a. Thickness: 10 mil.
 - b. Closures: stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
 2. ASTM B209 formed aluminum, 0.016-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
 - a. Overlap: 2-inch minimum.
 - b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
 - c. Metal jacket bands: 3/8-inch wide, 0.015-inch thick aluminum or 0.010-inch thick stainless steel.
 3. ASTM A666, Type 304 stainless Steel, 0.010-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
 - a. Overlap: 2-inch minimum.
 - b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
 - c. Metal jacket bands: 3/8-inch wide, 0.010-inch thick stainless steel.
 4. Laminated Self-Adhesive Water and Weather Seals - Permanent acrylic self-adhesive System; weather resistant, high puncture and tear resistance; meeting or exceeding requirements of UL 723; applied in strict accordance with manufacturers' recommendations.
- B. Fitting Insulation
1. Pre-formed fiberglass, preformed perlite, mitered fiberglass, mitered perlite or calcium silicate in lieu of PVC systems. Protect fittings with field-applied fitting covers.
- C. Tapes
1. Vapor barrier type, self-sealing, non-corrosive, fire-retardant. Approved Manufacturer: Compac Corporation

2.03 ELASTOMERIC INSULATION

- A. Approved Manufacturers:
1. Armacell LLC
 2. K-Flex USA, Inc.
- B. Flexible, tubular (Type 1) or sheet/roll form (Type 2) closed-cell elastomeric insulation complying with ASTM C534, Grade 1 - Standard (temperature range(-)297°F to 220°F; use molded tubular material wherever possible.

2.04 ELASTOMERIC INSULATION ACCESSORIES

- A. Adhesives:
1. Air dried, waterproof vapor barrier contact adhesive, compatible with insulation for joining of seams and butt joints.
- B. Finishes:
1. Provide a weather and UV resistant protective finish for outdoor applications in accordance with the manufacturer's recommendations.

2.05 CELLULAR GLASS INSULATION

- A. Approved Manufacturers:
1. Pittsburgh Corning Corporation
- B. Cellular glass insulation meeting ASTM C552, Type II.

2.06 CELLULAR GLASS INSULATION ACCESSORIES

- A. Field-Applied Jackets and Fitting Covers:
 - 1. ASTM B209 formed aluminum, 0.016-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
 - a. Overlap: 2-inch minimum.
 - b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
 - c. Metal jacket bands: 3/8-inch wide, 0.015-inch thick aluminum or 0.010-inch thick stainless steel.
 - 2. ASTM A666, Type 304 stainless Steel, 0.010-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
 - a. Overlap: 2-inch minimum.
 - b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
 - c. Metal jacket bands: 3/8-inch wide, 0.010-inch thick stainless steel.
 - 3. Laminate: Factory applied vapor retarder jacket: ASJ/SSL conforming to ASTM C 1136 Type I, secured with self-sealing longitudinal laps and butt strips.
- B. Adhesives:
 - 1. Two component adhesive for adhering cellular glass insulation to itself or to other porous or nonporous substrates. Approved products: PC 88 Adhesive by Pittsburgh-Corning.
- C. Joint Sealants:
 - 1. Styrenebutadiene rubber sealant, stainless steel compatible. Approved products: Pittseal 727 Sealant by Pittsburgh-Corning.
- D. Coatings:
 - 1. Vapor and weather barrier acrylic latex coating. Approved products: Pittecote 404 Coating by Pittsburgh-Corning.
 - 2. Vapor and weather barrier asphalt coating. Approved Products: Pittecote 300 Coating by Pittsburgh-Corning.

2.07 HIGH DENSITY JACKETED INSULATION INSERTS FOR HANGERS AND SUPPORTS

- A. For use with Fiberglass Insulation:
 - 1. Cold Service Piping:
 - a. Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
 - 2. Hot Service Piping:
 - a. Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
 - b. Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.
- B. For Use with Flexible Elastomeric Foam Insulation:
 - 1. Provide to prevent thermal bridging and formation of condensation.
 - a. Provide insulated piping supports at clamping points to prevent crushing and cross section area reduction of insulation.
 - b. Load bearing PET or closed cell EPDM core.
 - c. UV degradation resistant exterior
 - d. Outside diameter shall match insulation sizes
 - e. Armacell ArmaFix EcoLight, Aeroflex Arefix, or equal

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that all piping is tested and approved prior to insulation installation.
- B. Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

3.02 INSTALLATION (GENERAL)

- A. Install all materials using skilled labor regularly engaged in this type of work. Install all materials in strict accordance with manufacturer's recommendations, building codes, and industry standards.
- B. Locate insulation and cover seams in the least visible location. Extend all surface finishes in such a manner as to protect all raw edges, ends and surfaces of insulation.
- C. On cold surfaces where a vapor retarder must be maintained, apply insulation with a continuous, unbroken moisture and vapor seal. Insulate and vapor seal all hangers, supports, anchors, or other projections secured to cold surfaces to prevent condensation.
- D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. For hot piping conveying fluids 140°F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- F. For hot piping conveying fluids over 140°F, insulate flanges and unions at equipment.
- G. Maintain continuous pipe insulation through walls, ceiling or floor openings, or sleeves except where firestop or firesafing materials are required.
- H. Install insulation neatly, accurately and without voids, in accordance with manufacturer's instructions and NIAC National Commercial and Industrial Insulation Standards.
- I. Insulate fittings, valves and flanges using premolded covers with precut insulation inserts.
- J. Insulate piping using insulation of type and thickness scheduled in this Section.
- K. Install metal shields between hangers or supports and the piping insulation. Install rigid insulation inserts as required between the pipe and the insulation shields. Fabricate inserts to be of equal thickness to the adjacent insulation and vapor seal as required. Insulation inserts shall be no less than the following lengths:

1½" to 2½" IPS	10" long
3" to 6" IPS	12" long
8" to 10" IPS	16" long
12" and over IPS	22" long

- L. Pipe exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor) to be finished with PVC jacket and fitting covers, aluminum jacket, or stainless steel jacket.

- M. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.
- N. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with <<aluminum; stainless steel>> jacket with seams located on bottom side of horizontal piping. Coordinate insulation installation with heat-tracing installation and testing. Insulate piping after tracing or heat distribution tape has been installed and tested for continuity.

3.03 INSTALLATION (FIBER GLASS)

- A. Provide a continuous vapor retarder on piping operating below ambient temperatures. Seal all joints, seams and fittings.
- B. Firmly butt and secure ends with appropriate butt-strip material. On high-temperature piping, double layering with staggered joints when recommended by the insulation manufacturer. When double layering, the inner layer should not be jacketed.
- C. Insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- D. Insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. Exterior Applications:
 - 1. Jacket piping and fittings exposed to the elements using aluminum or stainless steel jackets with a factory applied moisture barrier. Hold firmly in place with a friction type Z lock or a minimum 2" overlap joint. Seal all joints completely along the longitudinal seam and install so as to shed water. Seal all circumferential joints by use of preformed butt strips; minimum 2" wide or a minimum 2" overlap. Overlap butt strips to the adjacent jacketing a minimum ½-inch and completely weather seal. Install a 6" to 10" unsealed slide joint every 25 to 30 lineal feet to allow for the thermal expansion of the pipe and jacketing. In addition, apply a thin bead of silicone grease in the overlap to prevent water migration while allowing the joint to slide. Install an unsealed slide joint where distance between fittings exceeds 8 lineal feet.
 - 2. Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with <<aluminum; stainless steel>> jacket with seams located on bottom side of horizontal piping.
- F. Cold Piping Insulation:
 - 1. On below freezing applications and in high abuse areas protect the ASJ jacket with a PVC vapor retarding outer jacket. Seal exposed ends of the insulation with a vapor retarder mastic installed per the manufacturer's recommendations. Apply vapor seals at butt joints at every fourth pipe section joint and at each fitting to isolate any water incursion.

2. On chilled water systems operating in conditions of: RH of 90% and above, follow the same guidelines as described above for below freezing applications.

3.04 INSTALLATION (ELASTOMERIC)

A. Piping:

1. Install pipe insulation by slitting tubular sections and applying onto piping or tubing. Alternately, slide unslit sections over the open ends of piping or tubing. Adhere and seal all seams and butt joints using adhesive.
2. Push insulation onto the pipe, never pull. Stretching of insulation may result in open seams and joints.
3. Tape the ends of the tubing before slipping the insulation over the new pipes to prevent dust from entering the pipe.
4. Clean cut all edges. Do not leave rough or jagged edges of the insulation. Use proper tools such as sharp non-serrated knives.
5. On cold piping, adhere insulation directly to the piping at the high end of the run using a two-inch strip of adhesive on the inner diameter of the insulation and on the pipe. Coat all exposed end cuts of the insulation with adhesive. Adhere all penetrations through the insulation and termination to the substrate to prevent condensation migration.
6. Use sheet insulation on all pipes larger than 6-inch diameter. Do not stretch insulation around the pipe. On pipes larger than 12-inch diameter, adhere insulation directly to the pipe on the lower 1/3 of the pipe. On pipes greater than 24-inch diameter, completely adhere insulation.
7. Stagger seams when applying multiple layers of insulation.

B. Valves, Flanges and Fittings:

1. Insulate all fittings with the same insulation thickness as the adjacent piping. Adhere all seams and mitered joints with adhesive. Sleeve screwed fittings and adhere with a minimum 1" overlap onto the adjacent insulation.
2. Insulate valves, flanges, strainers, and Victaulic couplings using donuts covered with sheet or oversized tubular insulation.

C. Hangers:

1. Support piping system using high density inserts with sufficient compressive strength. Apply elastomeric foam insulation with the same or greater thickness than the pipe insulation to pipe supports. Seal all joints with adhesive.
2. Standard and split hangers - Insulate piping supported by ring hangers with the same insulation thickness as the adjacent pipe. Seal all seams and butt joints with adhesive. Sleeve ring hangers using oversized tubular insulation. On cold piping, extend insulation up the hanger rod a distance equal to four times the insulation thickness. Insulation tape may be used to a thickness equal to the adjacent insulation thickness.
3. Clevis hangers or other pipe support systems - Install saddles under all insulated lines at unistrut clamps, clevis hangers, or locations where insulation may be compressed due to the weight of the pipe. Insert and adhere wooden dowels or blocks of a thickness equal to the insulation to the insulation between the pipe and the saddle.
4. Pre-insulated pipe hangers can be used to prevent compression of insulation at standard split, clevis hangers or other pipe support systems. Adhere a pair of non-skid pads to the clamps to minimize the movement. In addition, to prevent loosening of the clamps, use an antivibratory fastener, such as a nylon-locking nut.

D. Exterior Applications:

1. Paint all outdoor exposed piping with two coats of UV resistant finish. Prior to applying the finish, wipe the insulation with denatured alcohol. Do not tint the finish.
2. Locate seams for all outdoor exposed piping on the lower half of the pipe.

3.05 INSTALLATION (CELLULAR GLASS)

- A. Apply cellular glass insulation in a single layer where thickness permits. Seal joints with joint sealant. Secure inner layers of insulation with fiber-reinforced tape. Secure the outermost layer of insulation with metal bands of appropriate width and thickness, two bands per insulation section.
1. Finish:
 - a. Outdoor Applications - field applied metal jacket.
 - b. Indoor Applications - factory applied ASJ.
- B. Consult the manufacturer's installation instructions for additional information.
- C. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness ad adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with <<aluminum; stainless steel>> jacket with seams located on bottom side of horizontal piping.

3.06 PIPING INSULATION MATERIAL SCHEDULE

SYSTEM OR SERVICE	LOCATION	INSULATION TYPE	JACKET
CONDENSATE DRAINS	INSIDE	ELASTOMERIC	
HVAC REFRIGERANT LINES	INSIDE	ELASTOMERIC	
HVAC REFRIGERANT LINES	OUTSIDE	ELASTOMERIC	EXTERIOR COATING
STEAM (LPS) TO 15 PSIG.	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM (LPS) TO 15 PSIG.	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	OUTSIDE	FIBER GLASS	ALUMINUM JACKET
STEAM CONDENSATE	OUTSIDE	FIBER GLASS	ALUMINUM JACKET

3.07 MINIMUM PIPING INSULATION THICKNESS (IN.)

FLUID OPERATING TEMP. RANGE (°F)	SYSTEMS IN TEMP. RANGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (IN.)				
		CONDUCTIVITY BTU*IN./(H*SQ. FT.*°F)	MEAN RATING TEMP (°F)	<1	1 TO < 1-1/2	1-1/2 TO < 4	4 TO < 8	=8
> 350		0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350		0.29-0.32	200	3.0	4.0	4.5	4.5	4.5
201-250		0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200		0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140		0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60		0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
< 40		0.20-0.26	50	0.5	1.0	1.0	1.0	1.5

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This section describes the insulation, jackets and insulating accessories for sheet metal ductwork as scheduled in Part 3 of this Section and as shown on the Drawings.

1.02 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. NFPA 255 - Surface Burning Characteristics of Building Materials.
- B. New York:
 - 1. International Energy Conservation Code - 2018
 - 2. International Mechanical Code - 2018
 - 3. Mechanical Code of New York State - 2020
 - 4. Energy Conservation Construction Code - 2020
 - 5. ASHRAE 90.1 - 2016
- C. Greenguard
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
- E. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- F. Underwriters Laboratories, Inc. (UL):
 - 1. UL 723 - Surface Burning Characteristics of Building Materials.
- G. American Society for Testing and Materials (ASTM):
 - 1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 3. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 4. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
 - 5. ASTM C612 - Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 6. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel
 - 7. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
 - 8. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
 - 9. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 10. ASTM E84 - Surface Burning Characteristics of Building Materials.
 - 11. ASTM E96 - Water Vapor Transmission of Materials.

1.03 DEFINITIONS

- A. Greenguard: Greenguard Environmental Institute
- B. IAQ: Indoor Air Quality
- C. EPA: Environmental Protection Agency
- D. WHO: World Health Organization
- E. ASJ: All Service Jacket

- F. SSL: Self-Sealing Lap
- G. FSK: Foil-Scrim-Kraft; jacketing
- H. PSK: Poly-Scrim-Kraft; jacketing
- I. PVC: Polyvinyl Chloride
- J. FRP: Fiberglass Reinforced Plastic
- K. Cold Piping/Ductwork/Surfaces: Pipes or surfaces where the normal operating temperature is 60 degrees F or lower.

1.04 SUBMITTALS

- A. Product data: To include product description, manufacturer's installation instructions, types and recommended thicknesses for each application, and location of materials.
- B. Provide samples and mock-ups of systems as required.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient conditions required by manufacturers of tapes, adhesives, mastics, cements, and insulation materials.
- B. Follow manufacturer's recommended handling practices.
- C. Supply fiberglass products that assure excellent IAQ (Indoor Air Quality) performance through Greenguard Certification.
- D. Mold: Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold growth remove it from the Site. If the material is wet but shows no sign of mold, dry rapidly and thoroughly. If it shows signs of facing degradation from wetting remove it from the Site. Discard air handling insulation used in the air stream if exposed to water.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 3 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.
- B. Materials:
 - 1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
 - 2. Certify insulation for duct, pipe and equipment for above grade exposed to weather outside building as being self-extinguishing for 1" thickness in less than 53 seconds when tested in accordance with ASTM D1692.

PART 2 - PRODUCTS

2.01 FIBERGLASS DUCT WRAP

- A. Flexible Fiber Glass Blanket meeting ASTM C553 Types I, II and III, and ASTM C1290; Greenguard compliant.
- B. Factory Applied Vapor Retarder Jacket: FSK or PSK conforming to ASTM C1136 Type II.
- C. Maximum service temperature of 250° F (Faced) or 350° F (Unfaced).
- D. Density:
 - 1. Concealed areas: Minimum 0.75 PCF.
 - 2. Exposed areas: Minimum 1.0 PCF.
- E. Approved Products:
 - 1. Friendly Feel Duct Wrap by Knauf

2.02 FIBERGLASS RIGID BOARD

- A. Rigid Fiber Glass Board insulation meeting ASTM C612 Type IA and IB.
- B. Mean temperature by ASTM C177 and a maximum service temperature of 450° F.
- C. Factory Applied Vapor Retarder Jacket: ASJ conforming to ASTM C1136 Type I, or FSK or PSK conforming to ASTM C1136 Type II.
- D. Density:
 - 1. Concealed areas: Minimum 3 PCF
 - 2. Exposed areas: Minimum 6 PCF
- E. Approved Products:
 - 1. Insulation Board by Knauf

2.03 ACOUSTIC DUCT LINER

- A. Conforming to ASTM C1071 Type 1 and NFPA 90A & 90B.
- B. Noise Reduction Coefficient (NRC): ASTM C423 Type A Mounting, 0.40 or higher for ½" product, 0.60 or higher for 1" product.
- C. Rated for a maximum air velocity of 6000 Feet per minute.
- D. Internally lined ductwork shall be provided with externally applied insulation.
- E. Approved Products:
 - 1. Textile Duct Liner with HydroshieldÔ Technology by Knauf.

2.04 FIBERGLASS INSULATION ACCESSORIES

- A. Aluminum Jacket - 0.016-inch (0.406 mm) thick in smooth, corrugated, or embossed finish with factory applied moisture barrier. Overlap 2-inch (50 mm) minimum.
- B. Laminated Self-Adhesive Water and Weather Seals - apply per manufacturers' recommendations.

- C. Tapes - Vapor barrier type, self-sealing, non-corrosive, fire-retardant. Approved Manufacturer: Compac Corporation
- D. Adhesives - Approved Manufacturer: Foster
- E. Mastic - Approved Manufacturer: Foster
- F. Vapor Barrier Coating - Approved Manufacturer: Foster

2.05 SHEET WATERPROOFING MEMBRANE

- A. Prefabricated, self-adhering, sheet-type waterproofing membrane shall be FlexClad-400 by MFM Building Products Corp. or approved equal.
- B. Description:
 - 1. Top Layer: Stucco-embossed, UV-resistant aluminum weathering surface.
 - 2. Middle Layer: Multiple layers of high-density cross-linked polymer film.
 - 3. Bottom Layer: Uniform layer of rubberized asphalt adhesive, protected by disposable silicone release paper.
- C. Color: As selected by Architect.
- D. Material Thickness: ASTM D1970/D1970M, 40 mils Nominal
- E. Flexibility: ASTM D1970/D1970M, Pass.
- F. Vapor Permeance: ASTM E96/E96M, 0 perms.
- G. Nail Sealability: ASTM D1970/D1970M, Pass.
- H. Heat Aging: ASTM D 794, Pass.
- I. Tear Resistance: ASTM D 1424, Average: 660 grams.
- J. Ultimate Elongation MD: ASTM D412, 434 percent.
- K. Ultimate Elongation CMD: ASTM D412, 246 percent.
- L. Low Temperature Flexibility: 1,000,000 Cycles at -10 Degrees F, 1,200 Cycles at -20 Degrees F, No cracking.
- M. Flame Spread Index: ASTM E84, 0.
- N. Smoke Density Index: ASTM E84, 5.
- O. Wind-Driven Rain: SFBC TAS-110-95, 100 mph, No leakage or failure.
- P. UV Stability: Excellent.
- Q. Accessories: MFM Spray Adhesive

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that all ductwork is tested and approved prior to insulation installation.

- B. Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

3.02 DUCTWORK REQUIRING INSULATION

- A. Insulate Ductwork as specified in the DUCTWORK INSULATION SCHEDULE.
 - 1. Insulate any additional ductwork or plenums indicated to be insulated on the Drawings.

3.03 INSTALLATION (GENERAL)

- A. Install all materials using skilled labor regularly engaged in this type of work. Install all materials in strict accordance with manufacturer's recommendations, building codes, and industry standards.
- B. Locate insulation and cover seams in the least visible location. Extend all surface finishes in such a manner as to protect all raw edges, ends and surfaces of insulation.
- C. On cold surfaces where a vapor retarder must be maintained, apply insulation with a continuous, unbroken moisture and vapor seal. Insulate and vapor seal all hangers, supports, anchors, or other projections secured to cold surfaces to prevent condensation.
- D. Install insulation neatly, accurately and without voids, in accordance with manufacturer's instructions and NIAC National Commercial and Industrial Insulation Standards.
- E. Install ductwork hanger supports on the outside of the insulation. Where vertical ducts are supported to the building structure, insulate the ductwork supports to prevent condensation.
- F. Insulate ductwork using insulation of the type and thickness scheduled at the end of this Section.
- G. If specified insulation board thickness does not cover ductwork standing seams and reinforcing angles, insulate them by adhering a grooved strip of fiberglass board with a thickness at least 1 ½ inches greater than the height of the seam or angle covered over the standing seam or angle.

3.04 ACOUSTIC DUCT LINER

- A. Apply Duct Lining in strict accordance with the latest edition of SMACNA's "HVAC Duct Construction Standard Metal & Flexible" and NAIMA's "Fibrous Glass Duct Liner Standard".
- B. Select length of mechanical fasteners in accordance with the manufacturer's recommendation as listed on each product. Install mechanical fasteners perpendicular to the duct surface, and such that the pin does not compress the liner more than 1/8 inch relative to the nominal thickness of the insulation.
- C. Adhesive shall conform to ASTM C916. Apply adhesive to the sheet metal with a 90% minimum coverage. Coat all exposed edges of the duct liner with the same adhesive. Repair all rips and tears using an adhesive that conforms to ASTM C916.
- D. Cover all internal duct areas with duct liner. Firmly butt transverse joints with no gaps and coat with adhesive. Overlap and compress longitudinal corner joints.
- E. When air velocities are 4000 to 6000 FPM, apply metal nosing to all upstream transverse edges to additionally secure the insulation.

3.05 FIBERGLASS WRAP INSULATION

- A. Apply external duct wrap per insulation schedule even where internally lined.
- B. Install Duct Wrap to obtain specified R-value using a maximum compression of 25%.
- C. Firmly butt all joints.
- D. Overlap the longitudinal seam of the vapor retarder a minimum of 2 inches.
- E. Where vapor retarder performance is required, repair all penetrations and damage to the facing using pressure-sensitive foil tape or mastic prior to system startup.
- F. Use pressure-sensitive foil tapes a minimum 3 inches wide and apply by moving pressure using a squeegee or other appropriate sealing tool.
- G. Additionally secure Duct Wrap to the bottom of rectangular ductwork over 24 inches wide using mechanical fasteners on 18-inch centers. Do not over-compress insulation during installation.
- H. Overlap unfaced Duct Wrap a minimum of 2 inches and fasten using 4-inch to 6-inch nails or skewers spaced 4 inches apart, or secured with a wire/banding system. Do not damage the Duct Wrap.

3.06 FIBERGLASS BOARD INSULATION

- A. Fit insulation by scoring, cutting and mitering to fit the contour of the ductwork.
- B. Attach insulation to ductwork in thickness scheduled by brushing adhesive uniformly on all sides of ductwork covering 100 percent of ductwork surface. Press insulation into place, making complete contact with adhesive. Butt edges of insulation board tightly together without gaps.
- C. Additionally, hold insulation in place by impaling on pins welded to all four sides of the ductwork. Locate and weld pins a minimum 12 inch on center with a minimum of 2 rows per side of duct and no less than 3 inches from the edges of the ductwork. Secure insulation to pins with 1 inch diameter hold-down washers. As an alternate to welded pins, provide "Gripnail" mechanical surface fasteners by Gripnail Corporation using pneumatic hammer designed for this work.
- D. Seal all joints, seams, breaks, and punctures in facing with adhesive and cover with 3 inch wide sealing tape. Flash supports with vapor barrier coating.
- E. For rectangular ducts and plenums exposed to weather, pitch ductwork or insulation board minimum ¼ inch per foot to prevent rainwater from accumulating on top of duct or plenum. Cover insulation board with Sheet Waterproofing Membrane.

3.07 SHEET WATERPROOFING MEMBRANE

- A. Surface Preparation:
 - 1. Prepare surfaces in accordance with manufacturer's instructions.
 - 2. Ensure tops of ducts have sufficient slope to eliminate ponding water.
 - 3. Ensure bottoms of ducts have foil-faced rigid insulation boards installed.
 - 4. Ensure surfaces are clean and dry.
 - 5. Remove dirt, dust, oil, grease, hand oils, processing lubricants, moisture, frost, and other contaminants that could adversely affect adhesion of waterproofing membrane.
 - 6. Prime metal, concrete, and masonry surfaces with primers approved by waterproofing membrane manufacturer.

B. Application:

1. Apply waterproofing membrane in accordance with manufacturer's instructions on all exterior insulated ductwork and at locations indicated on the Drawings.
2. Apply membrane to clean, dry, primed metal ductwork and foil-faced rigid insulation boards. Do not apply over wet or non-rigid insulation.
3. Apply membrane in accordance with manufacturer's air, material, and surface temperature requirements.
4. Apply firm, uniform pressure with hand roller to entire membrane to ensure proper adhesion. Concentrate pressure at seams and on underside of ductwork.
5. Apply membrane to ducts in accordance with manufacturer's instructions.
6. Apply membrane shingle fashion to shed water over, not against laps.
7. Do not terminate membrane on bottom of duct.
8. Apply minimum 3-inch laps and minimum 6-inch end laps for ductwork applications.
9. Embed membrane to bottom of ducts over 24 inches wide in light continuous layer of adhesive applied to insulation face.
10. Apply membrane to bottom of insulated ducts over 36 inches wide using mechanical attachment, in addition to adhesive, in accordance with manufacturer's instructions. Install pints on 12-inch centers with rows staggered.
11. Apply adhesive to areas where special adhesion requirements exist, including duct bottoms, flashings, transitions, joints, elbows, valves, tees, and other fittings.

C. Protection:

1. Protect applied waterproofing membrane and fabric flexible duct connections from damage during construction.

3.08 DUCTWORK INSULATION SCHEDULE**A. Fiber Glass Insulation Schedule:**

Ductwork System	Type	Minimum R-Value
Supply Ducts and Plenums, Concealed	Fiberglass Duct Wrap	6
Return Ducts and Plenums, Concealed	Fiberglass Duct Wrap	6
Supply and Return Ducts and Plenums, Exposed in the Space Served	Uninsulated	NA
Supply and Return Ducts and Plenums, Exposed Other Than in the Space Served	Fiberglass Rigid Board	6
Outdoor Air Intake Ducts, Indoors	Fiberglass Rigid Board	6
Ducts Located Outdoors	Fiberglass Rigid Board	8
Unused Portions of Louvers	Louver Blank Off Panels	As Specified
Ductwork Upstream and Downstream of Air Handling Units and Supply and Return Fans, Located Indoors	Internal Acoustic Duct Lining	Note 1, 2
Ductwork Upstream and Downstream of Air Handling Units and Supply and Return Fans, Located Outdoors	Internal Acoustic Duct Lining	Note 1, 2
General Exhaust Ducts Except as Noted	Uninsulated	NA

Notes:

1. Ductwork to be provided with 1-inch internal acoustic lining in addition to externally applied insulation in accordance with the table above.

SECTION 230719 - DUCTWORK INSULATION **H2M**

2. Unless noted otherwise on drawings, duct liner shall be continuous, extending from air handling unit/fan sections out for a linear distance of 20'.

END OF SECTION

PART 1 - GENERAL

1.01 COMMISSIONING CONTRACT

- A. The Owner will employ an independent Commissioning Authority (CA). The mechanical contractor shall support all commissioning efforts as defined here-in and as required by the CA, in reference specifications or as otherwise required under standard care of the type of project and it's delivery.

1.02 DESCRIPTION

- A. General provisions and other mechanical systems are specified in other Sections of Division 23.
- B. Commissioning is an ongoing process and shall be performed throughout construction. Commissioning requires the participation of Division 23 to ensure that all systems are operating in a manner consistent with the Contract Documents. Division 23 shall be familiar with the commissioning plan issued by the Commissioning Authority (CA) as it applies to the work of Division 23 and shall execute all commissioning responsibilities assigned to them in the Contract Documents.
- C. Commissioning shall conclude with the completion of all required deferred testing, training and system documentation as specified and required to ensure the proper operation of the mechanical equipment and systems provided by this Division.
- D. This Section covers mechanical systems commissioning, as required to demonstrate that the equipment and systems of Division 23 are ready for safe and satisfactory operation, as defined by project documents. Commissioning shall include, but shall not be limited to, identification of piping and equipment, cleaning, lubrication, start-up, check-out, and testing, adjusting, and balancing of systems, preparation of equipment and systems documentation and of maintenance and operation manuals, Owner training, and preparation of record drawings.

1.03 QUALITY ASSURANCE

- A. The mechanical contractor shall identify a mechanical commissioning supervisor. The mechanical commissioning supervisor should have a minimum of ten years experience in mechanical contracting. The mechanical commissioning supervisor shall become familiar with the design intent and the requirements of the commissioning process as defined in this Section. The mechanical commissioning supervisor shall attend all commissioning meetings and coordinate the commissioning schedule as outlined by the CA. The mechanical commissioning supervisor shall assist the CA in coordinating and executing the required commissioning activities.

1.04 MECHANICAL CONTRACTOR RESPONSIBILITIES

- A. Include and itemize the cost of commissioning in the contract price with an estimated breakdown of hours for meeting and functional testing requirements.
- B. The mechanical commissioning supervisor shall be responsible for scheduling, supervising, and coordinating the startup, testing and commissioning activities as specified herein with the CA. Specific requirements of the mechanical contractor and associated subcontractors are identified in this Section and in other Sections of this Division.
- C. The CA shall conduct independent verification of installation, pre-functional, start-up and functional testing as required here-in.

D. Mechanical commissioning shall take place in three phases. Commissioning requirements for each phase are as follows:

1. Construction Phase

- a. The Contractor shall attend a Commissioning Scoping meeting and additional commissioning meetings as required throughout the commissioning process. These commissioning meetings will be monthly during early construction and may increase in frequency to weekly during the start-up, pre-functional and functional testing phases. The Contractor shall assure that all subcontractors who have commissioning responsibilities attend the Commissioning Scoping meeting and other commissioning meetings, as appropriate, during the construction process.
- b. The Contractor shall report, in writing, to the CA at least as often as commissioning meetings are scheduled concerning the status of his activities as they affect the commissioning process, the status of each discrepancy identified, the pre-functional and functional testing process, explanations of any disagreements with the identified deficiencies, and proposed resolution and schedule.
- c. The Contractor shall provide the CA with normal cut sheets and shop drawing submittals of equipment that is to be commissioned.
- d. The Contractor shall provide documentation to the CA for development of pre-functional and functional performance testing procedures, prior to normal O&M manual submittals. This documentation shall include detailed manufacturer installation, start-up, operating, troubleshooting and maintenance procedures; full details of any owner-contracted tests; fan and pump curves; full factory testing reports, if any; and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA. The CA may request further documentation necessary for the development of functional performance testing and the commissioning process. This data request may be made prior to normal submittals.
- e. The Contractor shall develop and submit to CA, for review prior to equipment or system startup, a complete startup and initial checkout plan using manufacturer's start-up procedures.
- f. The Contractor shall review and complete the CA's pre-functional check-sheets and sign-off on the appropriate areas when the Contractor and sub-contractors are complete. The pre-functional test sheets will be developed by the CA. The CA may conduct their own pre-functional testing check in parallel with the Contractors or verify the contractors completed pre-functional forms after submission.
- g. The Contractor shall provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review.
- h. The Contractor shall assist in clarifying the proposed operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
- i. The CA shall prepare the specific functional test procedures as specified herein. The Contractors shall review the CA's proposed functional performance test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
- j. Contractor shall prepare a preliminary schedule for Division 23 commissioning activities, to include pipe and duct system testing, flushing and cleaning, equipment start-up, and TAB start and completion, for use by the CA and shall update the schedule as appropriate. CA will assist in providing expected time durations for Cx activities.
- k. The Contractor shall update the commissioning activities and notify any delays in the progress meetings. Contractor shall notify the CA during the commissioning meetings when commissioning activities not yet performed or not yet scheduled will delay construction. Mechanical equipment start-up shall not be initiated until the complete

sign-off of the pre-functional check-sheets as developed by the CA as specified in other Sections of Division 23.

- I. The Contractor shall provide startup testing for all HVAC equipment, including the building automation control system and shall execute the mechanical-related portions of the pre-functional checklists for all commissioned equipment during the startup and initial checkout process. The CA shall conduct an independent start-up once the Contractor is complete with their requirements.
- m. The Contractor shall perform and clearly document all completed start-up and system operational checkout procedures, providing a copy to the CA.
- n. The Contractor shall correct current A/E punch list and CA deficiency items before functional performance testing can begin. Air and water TAB shall be completed with discrepancies and problems remedied before functional testing of the respective air or water related systems.
- o. The CA shall generate the functional testing procedure and record to the mechanical contractor. The mechanical contractor shall review and provide support to the functional testing process. Contractor shall operate boilers, pumps, etc., and systems in accordance with the CA requirements, open and close disconnects and switch normal and emergency power requirements as directed by the CA and the functional testing procedures.
- p. The Contractor shall report in writing to the CA at least as often as commissioning meetings are being scheduled concerning the status of each outstanding discrepancy identified during commissioning, pre-functional and functional performance testing. Report shall include description of the identified discrepancy, explanations of any disagreements, and proposals and schedule for correction of the discrepancy.
 - 1) Acceptance Phase. The Contractor shall assist and cooperate with the CA in the commissioning process by:
 - (a) Putting all HVAC equipment and systems into operation and continuing the operation during each working day of the test and balance and commissioning effort, as required.
 - (b) For a given area, have all required pre-functional checklists, calibrations, startup and selected functional tests of the mechanical system and associated controls completed and approved by the CA prior to beginning the test and balance process.
 - (c) Provide a qualified technician to operate the controls as required to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.
 - (d) Provide a TAB representative to assist the CA on conducting a random 10% check of the air and water distribution requirements.
 - (e) Including cost of sheaves and belts that may be required to obtain required equipment performance, as measured by the test and balance effort.
 - (f) Providing test holes in ducts and plenums where directed by TAB to allow air measurements and air balancing. Providing an approved plug.
 - (g) Providing temperature and pressure taps according to the Construction Documents for TAB and commissioning testing.
 - (h) Installing a P/T plug at each water sensor that is an input point to the Control System.
 - (i) Providing skilled technicians to execute starting and operation of equipment.
 - (j) The CA will conduct functional performance testing. The Contractor may be required to have a skilled technician present during functional testing, although it is suggested that one be available to make adjustments or assist in problem-solving.
 - (k) The CA will require full and part load performance verifications as well as seasonal and simulated testing requirements. The Contractor shall be prepared to operate different components of various systems (example, DX and hot water systems to generate loading strategies) during the functional testing.

- (l) Correct deficiencies (differences between specified and observed performance) as interpreted by the CA and A/E.
 - (m) Prepare O&M manuals according to the Contractor Documents, including clarifying and updating the original sequence of operation to as-built conditions.
 - (n) Maintain on site redline as built drawings and produce final "As-built" drawings for all project drawings and contractor-generated coordination drawings. List and clearly identify on the as-built drawings the locations of all airflow stations and sensor installations that are not equipment mounted.
 - (o) Provide specified training of the Owner's operating personnel in accordance with the CA's overview and outline.
 - (p) Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
 - (q) Provide updated diagrammatical logic for all TAB adjustments to the system.
- 2) Warranty Period. During the warranty period, the Contractor shall:
- (a) Be available during seasonal or deferred functional performance testing conducted by the CA, according to the specifications.
 - (b) Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

1.05 TAB CONTRACTOR RESPONSIBILITIES

- A. Six weeks prior to the starting of the T&B, submit to the CA, the qualifications of the site technician(s) for the project, including three (3) names of contractors and facility managers of recent projects on which the personnel were in charge. The Owner and CA will approve the site technician for this job.
- B. Three months prior to the start of the TAB, submit a TAB plan and approach for each system. The plan shall be reviewed by the TAB and the CA for review and approval. The submitted plan shall include:
 - 1. Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and Contractors to sufficiently understand the design intent for each system.
 - 2. An explanation of the intended use of the building control system.
 - 3. All field check-out sheets and logs to be used that lists each piece of equipment to be tested adjusted and balanced with the data cells to be gathered for each.
 - 4. Final test report forms to be used during this process:
 - a. Detailed step by step procedures for TAB work for each system and issue: terminal flow calibration; diffuser proportioning; branch and submain proportioning; total flow calculations; and rechecking diversity issues.
 - b. List all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of each of the test procedures, parameters and formulas to be used.
 - c. Details of how total flow will be determined (Air: sum of terminal flows via BMS calibrated readings or via hood, pitot tube or flow stations). Details of how total water flow will be determined (Water: pump curves, circuit setters, flow station, ultrasonic, etc.).
 - d. The identification and types of measurement instruments to be used and their most recent calibration date.
 - e. Specific procedures that will ensure that both air and watersides will be operating at there lowest possible pressure at the point where the system will operate.
 - f. Confirmation that the TAB contractor understands the outside air ventilation criteria under all conditions and how this will be measured during normal, economizer and unoccupied conditions.

- g. Details of how building static, room static and exhaust fan capacity will be checked.
- h. Proposed selection points for traverse measurement locations on the as-built documents. Review the placement of the HVAC measurement devices for proper straight runs and accuracy.
- i. Submit a plan for testing and checking the fume hood system exhaust requirements.
- j. Plan for formal progress reports including scope and frequency.
- k. Plan for formal deficiency reports including scope and frequency.
 - 1) TAB contractor shall attend commissioning meetings as directed by the CA and the general contractor.
 - 2) TAB contractor shall communicate in writing to the controls contractor and the CA all setpoint and parameter changes made or problems and discrepancies identified during the TAB process that would affect the control loop system set-up and operation.
 - 3) Submit written report of discrepancies, deficit or uncompleted work by others, contract interpretation requests and list of completed tests to the CA at least once per week.
 - 4) After the TAB plan is accepted and two-weeks prior to TAB work, the contractor shall conduct a pre-balancing conference. Prior to the pre-balancing conference, the TAB contractor shall inspect the system readiness for testing and balancing. The TAB contractor shall prepare a list of deficiencies and uncompleted work that will affect the TAB process. This list shall be submitted to the CA and the general contractor.
 - 5) The TAB contractor shall review the projected schedule and provide, in writing, to the CA and CM any delays in the schedule and what items will require completion prior to the TAB work.
 - 6) The CA agent shall conduct independent verification of 10% of air and water end-devices for acceptance after the TAB contractor states in writing that they are complete with Testing & Balancing. The TAB contractor shall provide a mechanic to assist the CA in this verification and shall include this in the scope and price of the Work.
 - 7) The TAB agent shall submit the TAB report to the CA for his review and comment. All data contained shall be re-verified in the field by the CA. A minimum of ten percent of the airflow readings shall be verified by the CA using his own equipment. All selection points shall be random. Total airflow shall be verified on all mains in the supply and the exhaust ducts.

1.06 CONTROL CONTRACTOR RESPONSIBILITIES

- A. Include and itemize the cost of commissioning in the contract price with an estimated breakdown of hours for meeting and functional testing requirements.
- B. The controls commissioning supervisor shall be responsible for scheduling, supervising, and coordinating the startup, testing and commissioning activities as specified herein with the CA. Specific requirements of the controls contractor and associated subcontractors are identified in this Section and in other Sections of this Division.
- C. The CA shall conduct independent verification of installation, pre-functional, start-up and functional testing as required here-in.
- D. Controls commissioning shall take place in three phases. Commissioning requirements for each phase are as follows:
 - 1. Construction Phase
 - a. Contractor shall attend a Commissioning Scope meeting and additional commissioning meetings as required throughout the commissioning process. These commissioning meetings will be monthly during early construction and increase in frequency to weekly during the start-up, pre-functional and functional testing phases.

Contractor shall assure that all subcontractors who have commissioning responsibilities attend the Commissioning Scope meeting and other commissioning meetings, as appropriate, during the construction process.

- b. Contractor shall report, in writing, to the CA at least as often as commissioning meetings are scheduled concerning the status of his activities as they affect the commissioning process, the status of each discrepancy identified, the pre-functional and functional testing process, explanations of any disagreements with the identified deficiencies, and proposed resolution and schedule.
- c. Contractor shall provide the CA with normal cut sheets and shop drawing submittals of equipment that is to be commissioned.
- d. Contractor shall provide documentation to the CA for development of pre-functional and functional performance testing procedures, prior to normal O&M manual submittals. This documentation shall include detailed manufacturer installation, start-up, operating, troubleshooting and maintenance procedures; full details of any owner-contracted tests; points listing; full factory testing reports, if any; and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA. The CA may request further documentation necessary for the development of functional performance testing and the commissioning process. This data request may be made prior to normal submittals.
- e. The Contractor shall develop and submit to CA, for review prior to equipment or system startup, a complete startup and initial checkout plan using manufacturer's start-up procedures.
- f. The Contractor shall review and complete the CA's pre-functional check-sheets and sign-off on the appropriate areas when the Contractor and sub-contractors are complete. The pre-functional test sheets will be developed by the CA. The CA may conduct their own pre-functional testing check in parallel with the Contractors or verify the contractors completed pre-functional forms after submission.
- g. Contractor shall provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review.
- h. Contractor shall assist in clarifying the proposed operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
- i. CA shall prepare for the specific functional test procedures as specified herein. The Contractors shall review the CA's proposed functional performance test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
- j. Controls contractor shall prepare a preliminary schedule for their commissioning activities, to include wiring, instrument installation, calibration, point-to-point verification, sequence of operation testing and emergency operating procedural testing for use by the CA and shall update the schedule as appropriate. The Contractor shall update the commissioning activities and notify any delays in the progress meetings. Contractor shall notify the CA during the commissioning meetings when commissioning activities not yet performed or not yet scheduled will delay construction.
- k. Controls instrument and equipment start-up shall not be initiated until the complete sign-off of the pre-functional check-sheets as developed by the CA as specified in other Sections of Division 23.
- l. Contractor shall provide startup testing for all HVAC equipment, including the building automation control system and shall execute the mechanical/controls-related portions of the pre-functional checklists for all commissioned equipment during the startup and initial checkout process. The CA shall conduct an independent start-up once the Contractor is complete with their requirements.

- m. Contractor shall perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
- n. Contractor shall correct current A/E punch list and CA deficiency items before functional performance testing can begin. Point-to-point verification shall be completed with discrepancies and problems remedied before functional testing of the respective controls related systems.
- o. The CA shall generate the functional testing procedure and record to the controls contractor. The controls contractor shall review and provide support to the functional testing process. Contractor shall aid in operating boilers, pumps, etc., and systems in accordance with the CA requirements, turn on and off normal and emergency power requirements as directed by the CA and the functional testing procedures.
- p. Contractor shall report, in writing, to the CA at least as often as commissioning meetings are being scheduled concerning the status of each outstanding discrepancy identified during commissioning, pre-functional and functional performance testing. Report shall include description of the identified discrepancy, explanations of any disagreements, and proposals and schedule for correction of the discrepancy.
 - 1) Acceptance Phase. Contractor shall assist and cooperate with the CA in the commissioning process by:
 - (a) Putting all HVAC equipment and systems into operation and continuing the operation during each working day of the test and balance and commissioning effort, as required.
 - (b) For a given area, have all required, pre-functional checklists, calibrations, startup and selected functional tests of the mechanical system and associated controls completed and approved by the CA prior to beginning the test and balance process.
 - (c) Provide a qualified technician to operate the controls as required to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.
 - (d) Provide a controls representative to assist the CA on conducting a random 10% check of the air and water distribution requirements.
 - (e) Providing skilled technicians to execute starting and operation of equipment.
 - (f) The CA will conduct functional performance testing. The Contractor may be required to have a skilled technician present during functional testing, although it is suggested that one be available to make adjustments or assist in problem-solving.
 - (g) The CA will require full and part load performance verifications as well as seasonal and simulated testing requirements. The Contractor shall be prepared to operate different components of various systems (example, chilled water and hot water systems to generate loading strategies) during the functional testing.
 - (h) Correct deficiencies (differences between specified and observed performance) as interpreted by the CA and A/E.
 - (i) Prepare O&M manuals according to the Contractor Documents, including clarifying and updating the original sequence of operation to as-built conditions.
 - (j) Maintain on site redline as built drawings and produce final "As-built" drawings for all project drawings and contractor-generated coordination drawings. List and clearly identify on the as-built drawings the locations of all airflow stations and sensor installations that are not equipment mounted.
 - (k) Provide specified training of the Owner's operating personnel in accordance with the CA's overview and outline.
 - (l) Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
 - (m) Provide a detailed marked up drawings of all the instruments and their installed location (P&ID) for instruments and components.
 - 2) Warranty Period. During the warranty period, the Contractor shall:

- (a) Be available during seasonal or deferred functional performance testing conducted by the CA, according to the specifications.
- (b) Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

PART 2 - PRODUCTS

2.01 SYSTEMS TO BE COMMISSIONED

- A. The following are systems to be commissioned:
 - 1. Condensing Units
 - 2. Unit Ventilators
 - 3. Exhaust Fans
 - 4. ERV
 - 5. Split Heat Pump Units

2.02 2.2. TEST EQUIPMENT

- A. All standard testing equipment required to the mechanical portion startup, initial checkout shall be provided by the Contractor responsible for the equipment or system being tested. This includes TAB and controls verification.
- B. The CA shall perform their own system verification and performance check-out. The CA shall provide their own calibrated equipment as required for this testing.
- C. All testing equipment associated with functional performance verification and point-to-point required by the CA shall be the responsibility of the CA. All testing equipment associated with the control's contractor point-to-point verification shall be the responsibility of the control's contractor.
- D. Special equipment, tools and instruments (only available from vendor or specific to a piece of equipment) required for the functional testing of that equipment, according to the requirements of the contract documents and the functional test procedures shall be provided to the CA by the installing contractor and shall become the property of the Owner at project completion as indicated in the specification.
- E. Proprietary test equipment and software required by any manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide test equipment, demonstrate its use and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon successful completion of the commissioning process as required in the specifications.

PART 3 - EXECUTION

3.01 SUBMITTALS

- A. Division 23 shall provide submittal documentation relative to commissioning as required in this Section Part 1.

3.02 3.2 STARTUP PLAN AND PREFUNCTIONAL TESTING

- A. The mechanical contractor and associated subcontractors shall be responsible for the installation of complete systems and sub-systems, fully functional, meeting the design objectives of the Contract Documents. Contractor shall follow the approved start-up, initial

checkout, and pre-functional testing procedures. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility to the CA or Owner.

- B. Pre-functional testing as directed and performed by the contractor shall be required for each piece of equipment to ensure that the equipment and systems are properly installed and ready for operation, so that functional performance testing may proceed without delays. Sampling strategies shall not be used for pre-functional testing. The pre-functional testing for all equipment and subsystems of a given system shall be successfully completed and documented prior to functional performance testing of the system. The mechanical contractor and sub-contractors shall sign off on the CA's pre-functional test sheets that they are complete and the system is ready. The CA will verify and conduct their own independent verification and start-up in parallel to the Contractor's verification. Any deficiencies identified during this process shall be noted and reviewed by the Contractors. Start-up and functional testing shall not proceed until all the deficiencies are corrected and verified by the CA.
- C. The following procedures shall apply to all equipment and systems to be commissioned.
 - 1. Start-up and Initial Checkout Plan. The contractor shall develop the detailed start-up and pre-functional testing plans for all equipment to be reviewed by the CA. The primary role of the CA in this process shall be to review the installation for construction completeness and ensure that all components have been installed as per the design documents. Only when pre-functional testing is complete and signed off by all Contractors, shall the Contractor start-up the equipment. Equipment and systems to be commissioned are identified in this Section Part 2.
 - 2. The start-up and initial checkout plan shall consist of the following as a minimum:
 - a. The manufacturer's standard written start-up and checkout procedures copied from the installation manuals and manufacturer's normally used field checkout sheets. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
 - b. First-run checklist for equipment, to include:
 - 1) Equipment properly set.
 - 2) Alignment of shafts and couplings.
 - 3) Adjustment of vibration isolators.
 - 4) Piping and equipment properly connected.
 - 5) Completion of initial lubrication procedures.
 - 6) Clean filters in place, as appropriate.
 - 7) Wiring properly connected.
 - 8) Electrical overload relays appropriate for load.
 - 9) Electrical accessories properly installed and adjusted.
 - 10) Controls, safeties, and time switches properly calibrated and set-up.
 - 11) Verification of direction of motor rotation after final electrical connections by jogging motor.
 - 12) Measurements of ampere draw of electric motors and comparison with nameplate rating and with overload heater ratings.
 - 13) The Contractor shall submit the start-up reports to the CA for review.
- D. The CA shall review and approve the procedures and the format for documenting them, noting any procedures that need to be added.
- E. Two weeks prior or startup, the Contractor shall schedule start-up and checkout with the Owner and CA. The execution of the start-up and checkout shall be directed and performed by the Contractor, in accordance with manufacturer's published procedures and with the approved procedures. The CA may be present for the Contractor's required startup and checkout of all systems and equipment to be commissioned.

- F. Sensor Calibration. Calibration of all sensors shall be included as part of the pre-functional testing and listed on the appropriate test checklists and reports, according to the specified procedures and accuracies for the devices and systems being tested.
- G. All contractor responsible start-up, checkout forms shall be completed and submitted to the CA for review.

3.03 FUNCTIONAL PERFORMANCE TESTS

- A. Functional Performance Verification (FPV) is the dynamic testing of systems (rather than just individual components) under full, part and seasonal requirements. Systems are tested under various loads and control sequences, such as low cooling and heating loads, component failures, unoccupied modes, fire alarm, etc. The systems are run through all the control sequences of operation and components are verified to be responding as the design intent and documents. FPV shall include; testing all sequences of operations, verification of system capacity, generating simulated signals to simulate sensor values, conducting simulated conditions to tests all loads and verify system performance during all conditions of operation and verifying design intent. In addition, each system shall be tested through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part and full load). Proper responses such as power failures, freeze conditions, low-oil pressures, equipment failures, etc. shall also be tested. The CA develops the functional test sheets and procedures in sequential written form, coordinates the testing, conducts the testing and documents the testing. Each contractor is required to supply personnel to assist during the functional performance testing where applicable.
- B. No system, equipment or component thereof shall be tested until the Contractor and the CM has certified, in writing, that the system, equipment and / or components are complete, have been tested, adjusted and balanced and are ready for validating and performance testing. FPV is scheduled by the CA after the pre-functional testing requirements are complete and signed-off by the CM and the CA. FPV will not be conducted until a written notice of completion by the CM confirming that the system is ready for FPV. The air balancing and water balancing must be complete and the controls must be debugged prior to the performance verification.
- C. Functional testing shall be conducted by the CA. Functional testing may not proceed until the systems have been properly installed, started-up and all deficiencies have been corrected.
- D. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CA and CM. Beginning system testing before full completion shall not relieve the Contractor from fully completing the system, including all pre-functional checklists.
- E. The Contractor shall provide personnel to operate the systems while functional performance testing is commencing. This shall include but not be limited to; starting and stopping of systems, opening and closing valves to create false loads on the system (with the capabilities of the existing system) and allowing the CA to manipulate the building automation systems to modulate the system requirements.
- F. The Contractor shall review the commissioning functional performance testing procedure supplied by the CA. After functional testing commences, the Contractor and the CA shall sign the functional test record and provide the owner and the CM a copy to review. All deficiencies either corrected in the field or outstanding shall be documented on the functional test forms for review by all parties.
- G. All functional testing must be completed and approved by the CA and the owner before the project will be considered substantially complete.

3.04 DEFERRED TESTING

- A. Deferred Testing. The Contractor shall be available to assist in seasonal testing (Summer, Winter and Intermediate), tests delayed until weather or other conditions until building construction is completed, required building occupancy or loading, or other conditions are suitable for the demonstration of equipment or system's performance, as specified. These deferred tests shall be conducted in the same manner as the seasonal tests as soon as possible. Deferred testing shall be executed, documented and deficiencies corrected as specified herein for functional performance testing. Any adjustments or corrections to the O&M manuals and "As built" documents required by the results of the testing shall be made before the seasonal testing process is considered complete.

3.05 TESTING DOCUMENTATION, NON-CONFORMANCE AND APPROVALS

- A. The CA shall clearly list any outstanding items of the initial start-up and pre-functional procedures that were not completed successfully. The testing form and any outstanding deficiencies shall be provided to the CM/Owner within two days of test completion. The CA shall review the Contractor's startup testing reports and shall submit either a non-compliance report or an approval form to the Contractor. The CA shall work with the Contractor and others as necessary, to correct and retest deficiencies or uncompleted items. The Contractor shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and resubmit an updated start-up report with a Statement of Correction on the original non-compliance report. When all requirements are satisfactorily completed, the CA shall recommend approval of the startup and pre-functional testing of each system and schedule the functional testing of the equipment or system.
- B. As functional performance testing progresses and a deficiency is identified, the CA shall discuss the issue with the executing contractor and the commissioning team.
1. When there is no dispute of the deficiency and the Contractor accepts responsibility for correcting it, the CA shall document the deficiency and the Contractor's response and intentions and the testing shall proceed, if possible. Corrections of minor deficiencies identified may be made by the Contractor during the functional performance testing, at the discretion of the CA. Every effort shall be made or expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the commissioning effort.
 2. When the identified deficiency is corrected, the Contractor shall sign the statement of correction at the bottom of the non-compliance form, certifying that the equipment is ready to be retested, and return the form to the CA. The CA shall schedule the retest of the equipment or system involved.
 3. If there is a dispute about an identified deficiency, the CA shall document the deficiency and the Contractor's response, and provide a copy to the Contractor. Every attempt shall be made to resolve the dispute at the lowest management level possible. When the dispute resolution has been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and returns the form to the CA. The CA shall schedule the retest of the equipment or system involved. Final interpretive authority shall be the A/E. Final acceptance authority shall be the Owner.
- C. During the functional performance testing of multiple units of similar equipment, the CA will test all of the installed equipment and components identified. If, under such a testing procedure, three or more identical pieces of equipment (size along does not constitute difference) fail to perform to the requirements of the Contract Documents (mechanically or substantively) due to manufacturing or installation defects not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CA. In such a case, the Contractor shall provide the CA with the following:

1. Within one week of notification from the CA, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CA within two weeks of the original notice.
2. Within two weeks of the original notification, the Contractor shall provide the CA and the A/E a signed and dated, written explanation of the problem, cause of failures, etc., and proposed solution, including full equipment submittals for corrective or replacement equipment, if appropriate. The proposed solution shall not be for less than the specification requirements of the original installation.
3. When approved, two examples of the proposed solution shall be installed by the Contractor and the CA shall schedule and conduct functional testing of the proposed solution. Upon completion of the functional testing of the proposed solution, the CA shall recommend the acceptance or disapproval of the proposed solution to the Owner.
4. Upon acceptance of the proposed solution by the Owner, the Contractor shall replace or repair all identical items, at their expenses and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week of approval of the proposed solution.
5. Cost of Retesting
 - a. The cost for CA and/or Owner personnel to conduct the retesting of a functional performance testing requirements necessitated because a specific pre-functional or start-up test item, reported to have been successfully completed, but found to be incomplete or faulty, shall be the responsibility of the Contractor.
 - b. For a deficiency identified during the functional testing, not related to any pre-functional checklist or start-up fault, the CA and Owner shall direct the retesting of the equipment once at "no charge" for their time. However, all costs for any subsequent retesting shall be the responsibility of the Contractor.
 - c. Items left incomplete, which later cause deficiencies or delays during functional testing may result in back-charges to the responsible party.

3.06 OPERATION AND MAINTENANCE (O&M) MANUALS

- A. The following O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.
- B. Division 23 shall compile and prepare documentation for all equipment and systems covered in Division 23 and deliver this documentation to the CM for inclusion in the O&M manuals, according to this section and other applicable section, prior to the training of owner personnel.
- C. The CA shall receive a copy of the O&M manuals for review.
- D. Operation and maintenance documentation, in hardback 3-ring loose-leaf binders except full size drawings and diskettes, shall cover all mechanical systems. Documentation shall include the following: operations and maintenance documentation directory; emergency information; operating manual; emergency information; maintenance manual; test reports; and construction documents.
- E. The operation and maintenance documentation package shall be submitted as one comprehensive package to the Owner and CA before systems start-up and commissioning, and shall be updated, revised and completed during, and at completion of, commissioning.

3.07 TRAINING OF OWNER PERSONNEL

- A. The mechanical commissioning supervisor shall be responsible for training coordination and scheduling of required training and for ensuring that all required training is completed. The CA shall oversee the content and adequacy of the training of Owner personnel.

- B. Prepare and submit a syllabus describing an overview of the program, describing how the program will be conducted, when and where meetings are to be held, names and company affiliations of lecturers, description of contents and outline for each lecture, and recommended reference material and outside reading. Obtain direction from the Owner on which operating personnel shall be instructed in each system. Proposed training schedules, materials, and lesson plans shall be submitted to the CA for review of the content and adequacy of the training of Owner personnel for commissioned equipment or systems.
- C. Mechanical Contractor. The mechanical contractor shall have the following training responsibilities:
 - 1. Provide the CA with training plan one week before the planned training.
 - 2. Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment.
 - 3. Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment.
 - 4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
 - 5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise, as well as in-depth knowledge of all modes of operation of the specific piece of equipment, is required. More than one party may be required to execute the training.
 - 6. The controls contractor shall attend sessions other than the controls training, for each type of equipment controlled by the BAS, to discuss the interaction of the BAS as it relates to the equipment being discussed.
 - 7. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.

3.08 WRITTEN WORK PRODUCTS

- A. Written work products of Contractors shall consist of the start-up and initial checkout plan and the filled out start-up, initial checkout and pre-functional checklists.

END OF SECTION

SECTION 230923 - AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION
SYSTEM

H2M

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All work of this Division shall be coordinated and provided by the single Building Management System (BMS) Contractor.
- B. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference the Division 23 Sections for details.
- C. The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.
- D. If the BMS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.

1.02 BMS DESCRIPTION

- A. The Building Management System (BMS) shall be a complete system designed for use with the enterprise IT systems. This functionality shall extend into the equipment rooms. Devices residing on the automation network located in equipment rooms and similar shall be fully IT compatible devices that mount and communicate directly on the IT infrastructure in the facility. Contractor shall be responsible for coordination with the owner's IT staff to ensure that the BMS will perform in the owner's environment without disruption to any of the other activities taking place on that LAN.
- B. All points of user interface shall be on standard PCs that do not require the purchase of any special software from the BMS manufacturer for use as a building operations terminal. The primary point of interface on these PCs will be a standard Web Browser.
- C. Servers shall be used for the purpose of providing a location for extensive archiving of system configuration data, and historical data such as trend data and operator transactions. All data stored will be through the use of a standard data base platform: Microsoft SQL Server Express or Microsoft SQL Server as dictated elsewhere in this specification.
- D. The work of the single BMS Contractor shall be as defined individually and collectively in all Sections of this Division specification together with the associated Point Sheets and Drawings and the associated interfacing work as referenced in the related documents. The district has standardized on EcoStruxure product from Schneider Electric, and the automatic temperature controls contractor is Stark Tech -- Attn: Jason Kross, krossj@starktech.com, (518) 312-6086. The mechanical contractor shall utilize a qualified controls sub-contractor authorized to work on the system mentioned above.
- E. The BMS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BMS.
- F. Provide a complete, neat and workmanlike installation. Use only manufacturer employees who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.

SECTION 230923 - AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION
SYSTEM

H2M

- G. The BMS as provided shall incorporate, at minimum, the following integrated features, functions and services:
1. Operator information, alarm management and control functions.
 2. Enterprise-level information and control access.
 3. Information management including monitoring, transmission, archiving, retrieval, and reporting functions.
 4. Diagnostic monitoring and reporting of BMS functions.
 5. Offsite monitoring and management access.
 6. Energy management
 7. Standard applications for terminal HVAC systems.
 8. BACnet integration to the Variable Refrigerant Flow Equipment

1.03 QUALITY ASSURANCE

- A. General
1. The Building Management System Contractor shall be a manufacturer-owned branch office of a recognized national manufacturer that is regularly engaged in the engineering, programming, installation and service of total integrated Building Management Systems.
 2. Quality Management Program
 - a. Designate a competent and experienced employee to provide BMS Project Management. The designated Project Manager shall be empowered to make technical, scheduling and related decisions on behalf of the BMS Contractor. At minimum, the Project Manager shall:
 - 1) Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
 - 2) Manage the financial aspects of the BMS Contract.
 - 3) Coordinate as necessary with other trades.
 - 4) Be responsible for the work and actions of the BMS workforce on site.

1.04 WORK BY OTHERS

- A. The demarcation of work and responsibilities between the BMS Contractor and other related trades shall be as outlined in the BMS RESPONSIBILITY MATRIX:

WORK	FURNISH	INSTALL	LOW VOLT. WIRING/TUBE	LINE POWER
BMS low voltage wiring	BMS	BMS	BMS	N/A
BMS communications bus wiring	BMS	BMS	BMS	N/A
BMS conduits and raceway	BMS	BMS	BMS	BMS
Automatic dampers	BMS	HVAC Contractor	N/A	N/A
Automatic valves	BMS	HVAC Contractor	BMS	N/A
Pipe insertion devices and taps including thermowells, flow and pressure stations	BMS	HVAC Contractor	BMS	BMS
BMS Current Switches	BMS	BMS	BMS	N/A
BMS Control Relays	BMS	BMS	BMS	N/A
All BMS Nodes, equipment, housings, enclosures and panels	BMS	BMS	BMS	Electrical Contractor
Packaged Equipment Network Thermostats	BMS	BMS	BMS	Electrical Contractor

SECTION 230923 - AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION
SYSTEM H2M

WORK	FURNISH	INSTALL	LOW VOLT. WIRING/TUBE	LINE POWER
Packaged Equipment factory-mounted controls	HVAC Contractor	HVAC Contractor	HVAC Contractor	Electrical Contractor

1.05 SUBMITTALS

- A. Shop Drawings, Product Data, and Samples
1. The BMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.
 2. Submittals shall be in defined packages. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Architect and Engineer for Contract compliance.
 3. Allow 15 working days for the review of each package by the Architect and Engineer in the scheduling of the total BMS work.
 4. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the BMS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.
 5. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.
 6. The BMS Contractor shall correct any errors or omissions noted in the first review.
 7. At a minimum, submit the following:
 - a. BMS network architecture diagrams including all nodes and interconnections.
 - b. Systems schematics, sequences and flow diagrams.
 - c. Points schedule for each point in the BMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
 - d. Samples of Graphic Display screen types and associated menus.
 - e. Detailed Bill of Material list for each system or application, identifying quantities, part numbers, descriptions, and optional features.
 - f. Control Damper Schedule including a separate line for each damper provided under this section and a column for each of the damper attributes, including: Code Number, Fail Position, Damper Type, Damper Operator, Duct Size, Damper Size, Mounting, and Actuator Type.
 - g. Details of all BMS interfaces and connections to the work of other trades.
 - h. Product data sheets or marked catalog pages including part number, photo and description for all products including software.

1.06 RECORD DOCUMENTATION

- A. Operation and Maintenance Manuals
1. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media, and include the following for the BMS provided:
 - a. Table of contents.
 - b. As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
 - c. Manufacturer's product data sheets or catalog pages for all products including software.
 - d. System Operator's manuals.
 - e. Archive copy of all site-specific databases and sequences.

- f. BMS network diagrams.
 - g. Interfaces to all third-party products and work by other trades.
 - h. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.
- 2. On-Line documentation: After completion of all tests and adjustments the contractor shall provide a copy of all as-built information and product data to be installed on a customer designated computer workstation or server

1.07 WARRANTY

- A. Standard Material and Labor Warranty:
 - 1. Provide a one-year labor and material warranty on the BMS.
 - 2. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at the cost of the BMS Contractor.
 - 3. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during BMS Contractor's normal business hours.

PART 2 - PRODUCTS

2.01 LARGE GENERAL DESCRIPTION

- A. The Building Management System (BMS) shall use an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the BMS shall support open communication protocol standards and integrate a wide variety of third-party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.
- B. The Building Management System shall consist of the following:
 - 1. Standalone Network Automation Engine(s)
 - 2. Field Equipment Controller(s)
 - 3. Input/Output Module(s)
 - 4. Local Display Device(s)
 - 5. Distributed User Interface(s)
 - 6. Network processing, data storage and communications equipment
 - 7. Other components required for a complete and working BMS
 - 8. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.
 - 9. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.
 - a. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.
 - b. The System shall maintain all settings and overrides through a system reboot.
 - 10. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

2.02 BMS ARCHITECTURE

- A. Automation Network

SECTION 230923 - AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION
SYSTEM **H2M**

1. The automation network shall be based on a PC industry standard of Ethernet TCP/IP. Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.
 2. The BMS shall network multiple user interface clients, automation engines, system controllers and application-specific controllers. Provide one (1) application and data system server for long term data storage that also permits up to five (5) simultaneous system users.
 3. All BMS devices on the automation network shall be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication.
 4. Network Automation Engines (NAE) and Network Control Engines (NCE) shall reside on the automation network.
 5. The automation network will be compatible with other enterprise-wide networks. Where indicated, the automation network shall be connected to the enterprise network and share resources with it by way of standard networking devices and practices.
- B. Control Network
1. Network Automation Engines (NAE) and Network Control Engines (NCE) shall provide supervisory control over the control network and shall be capable of supporting both of the following communication protocols as required:
 - a. BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9
 - b. LonWorks enabled devices using the Free Topology Transceiver (FTT-10a).
 2. The Network Engines shall be BACnet Testing Labs (BTL) certified and carry the BTL Label. The NAE shall be tested and certified as a BACnet Building Controller (B-BC).
 3. Control networks shall provide either "Peer-to-Peer," Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.
 4. DDC Controllers shall reside on the control network.
 5. Control network communication protocol shall be BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135. LonWorks is only acceptable for third party integration where the third party device is unable to communicate using BACnet protocol.
 6. A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided for each controller device (master or slave) that will communicate on the BACnet MS/TP Bus.
 7. The PICS shall be submitted prior to contract award, when requested, as a condition of award. Otherwise, they shall be part of the project submittal package.
- C. Integration
1. BACnet Protocol Integration - BACnet
 - a. The neutral protocol used between systems shall be either BACnet over Ethernet and comply with the ASHRAE BACnet standard 135-2008 or BACnet MS/TP communicating at 38,400 baud.
 - b. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.
 - c. The ability to command, share point object data, change of state (COS) data and schedules between the host and BACnet systems shall be provided.

2.03 USER INTERFACE

- A. Dedicated Web Based User Interface
1. The BMS Contractor shall provide and install on the maintenance manager's personal computer the ability for command entry, information management, network alarm management, and database management functions for the BMS. All real-time control functions, including scheduling, history collection and alarming, shall be resident in the BMS Network Automation Engines to facilitate greater fault tolerance and reliability.
 2. Dedicated User Interface Architecture - The architecture of the computer shall be implemented to conform to industry standards, so that it can accommodate applications

provided by the BMS Contractor and by other third party applications suppliers, including but not limited to Microsoft Office Applications. Specifically it must be implemented to conform to the following interface standards.

- a. Latest version of an internet browser for user interface functions
 - b. Microsoft Office Professional for creation, modification and maintenance of reports, sequences other necessary building management functions
 - c. Microsoft Outlook or other e-mail program for supplemental alarm functionality and communication of system events, and reports
 - d. Required network operating system for exchange of data and network functions such as printing of reports, trends and specific system summaries
- B. Distributed Web Based User Interface
1. All features and functions of the dedicated user interface previously defined in this document shall be available on any computer connected directly or via a wide area or virtual private network (WAN/VPN) to the automation network and conforming to the following specifications.
 2. The software shall run on wired and wireless network, on PC, laptop, tablet or smartphone, using Microsoft Edge or latest applicable browser supporting the following functions:
 - a. Configuration
 - b. Commissioning
 - c. Data Archiving
 - d. Monitoring
 - e. Commanding
 - f. System Diagnostics
- C. Site Management User Interface Application Components
1. Operator Interface
 - a. An integrated browser based client application shall be used as the user operator interface program.
 - b. The System shall employ an event-driven rather than a device polling methodology to dynamically capture and present new data to the user.
 - c. All Inputs, Outputs, Setpoints, and all other parameters as defined within Part 3, shown on the design drawings, or required as part of the system software, shall be displayed for operator viewing and modification from the operator interface software.
 - d. The user interface software shall provide help menus and instructions for each operation and/or application.
 - e. The system shall support customization of the UI configuration and a home page display for each operator.
 - f. The system shall support user preferences in the following screen presentations:
 - 1) Alarm
 - 2) Trend
 - 3) Display
 - 4) Applications
 - g. All controller software operating parameters shall be displayed for the operator to view/modify from the user interface. These include: setpoints, alarm limits, time delays, PID tuning constants, run-times, point statistics, schedules, and so forth.
 - h. The Operator Interface shall incorporate comprehensive support for functions including, but not necessarily limited to, the following:
 - 1) User access for selective information retrieval and control command execution
 - 2) Monitoring and reporting
 - 3) Alarm, non-normal, and return to normal condition annunciation
 - 4) Selective operator override and other control actions
 - 5) Information archiving, manipulation, formatting, display and reporting
 - 6) BMS internal performance supervision and diagnostics
 - 7) On-line access to user HELP menus

- 8) On-line access to current BMS as-built records and documentation
 - 9) Means for the controlled re-programming, re-configuration of BMS operation and for the manipulation of BMS database information in compliance with the prevailing codes, approvals and regulations for individual BMS applications
 - i. The system shall support a list of application programs configured by the users that are called up by the following means:
 - 1) The Tools Menu
 - 2) Hyperlinks within the graphics displays
 - 3) Key sequences
 - j. The operation of the control system shall be independent of the user interface, which shall be used for operator communications only. Systems that rely on an operator workstation to provide supervisory control over controller execution of the sequences of operations or system communications shall not be acceptable.
2. Navigation Trees
 - a. The system will have the capability to display multiple navigation trees that will aid the operator in navigating throughout all systems and points connected. At minimum provide a tree that identifies all systems on the networks.
 - b. Provide the ability for the operator to add custom trees. The operator will be able to define any logical grouping of systems or points and arrange them on the tree in any order. It shall be possible to nest groups within other groups. Provide at minimum 5 levels of nesting.
 - c. The navigation trees shall be "dockable" to other displays in the user interface such as graphics. This means that the trees will appear as part of the display, but can be detached and then minimized to the Windows task bar. A simple keystroke will reattach the navigation to the primary display of the user interface.
3. Alarms
 - a. Alarms shall be routed directly from Network Automation Engines to PCs and servers. It shall be possible for specific alarms from specific points to be routed to specific PCs and servers. The alarm management portion of the user interface shall, at the minimum, provide the following functions:
 - 1) Log date and time of alarm occurrence.
 - 2) Generate a "Pop-Up" window, with audible alarm, informing a user that an alarm has been received.
 - 3) Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
 - 4) Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.
 - 5) Provide the ability to direct alarms to an e-mail address or alphanumeric pager. This must be provided in addition to the pop up window described above. Systems that use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
 - 6) Any attribute of any object in the system may be designated to report an alarm.
 - b. The BMS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions.
 - c. The BMS shall allow a minimum of 4 categories of alarm sounds customizable through user defined wav.files.
 - d. The BMS shall annunciate application alarms at minimum, as required by Part 3.
4. Reports and Summaries
 - a. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:
 - 1) All points in the BMS
 - 2) All points in each BMS application

- 3) All points in a specific controller
 - 4) All points in a user-defined group of points
 - 5) All points currently in alarm
 - 6) All points locked out
 - 7) All user defined and adjustable variables, schedules, interlocks and the like.
 - b. Summaries and Reports shall be accessible via standard UI functions and not dependent upon custom programming or user defined HTML pages.
 - c. Selection of a single menu item, tool bar item, or tool bar button shall print any displayed report or summary on the system printer for use as a building management and diagnostics tool.
 - d. Provide the capability to view, command and modify large quantities of similar data in tailored summaries created online without the use of a secondary application like a spreadsheet. Summary definition shall allow up to seven user defined columns describing attributes to be displayed including custom column labels. Up to 100 rows per summary shall be supported. Summary viewing shall be available over the network using a standard Web browser.
5. Schedules
- a. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:
 - 1) Weekly schedules
 - 2) Exception Schedules
 - 3) Monthly calendars
 - b. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.
 - c. It shall be possible to define one or more exception schedules for each schedule including references to calendars
 - d. Monthly calendars shall be provided that allow for simplified scheduling of holidays and special days for a minimum of five years in advance. Holidays and special days shall be user-selected with the pointing device or keyboard, and shall automatically reschedule equipment operation as previously defined on the exception schedules.
 - e. Changes to schedules made from the User Interface shall directly modify the Network Automation Engine schedule database.
 - f. Schedules and Calendars shall comply with ASHRAE SP135/2008 BACnet Standard.
 - g. Selection of a single menu item or tool bar button shall print any displayed schedule on the system printer for use as a building management and diagnostics tool.
 - h. Software shall be provided to configure and implement optimal start and stop programming based on existing indoor and outdoor environmental conditions as well as equipment operating history
6. Password
- a. Multiple-level password access protection shall be provided to allow the user/manager to user interface control, display, and database manipulation capabilities deemed appropriate for each user, based on an assigned password.
 - b. Each user shall have the following: a user name (accept 24 characters minimum), a password (accept 12 characters minimum), and access levels.
 - c. The system shall allow each user to change his or her password at will.
 - d. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.
 - e. A minimum of six levels of access shall be supported individually or in any combination as follows:
 - 1) Level 1 = View Data
 - 2) Level 2 = Command
 - 3) Level 3 = Operator Overrides
 - 4) Level 4 = Database Modification
 - 5) Level 5 = Database Configuration
 - 6) Level 6 = All privileges, including Password Add/Modify

SECTION 230923 - AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION
SYSTEM H2M

- f. A minimum of 100 unique passwords shall be supported.
 - g. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.
 - h. Operators shall be further limited to only access, command, and modify those buildings, systems, and subsystems for which they have responsibility. Provide a minimum of 100 categories of systems to which individual operators may be assigned.
 - i. The system shall automatically generate a report of log-on/log-off and system activity for each user. Any action that results in a change in the operation or configuration of the control system shall be recorded, including: modification of point values, schedules or history collection parameters, and all changes to the alarm management system, including the acknowledgment and deletion of alarms.
- 7. Screen Manager
 - a. The User Interface shall be provided with screen management capabilities that allow the user to activate, close, and simultaneously manipulate a minimum of 4 active display windows plus a network or user defined navigation tree.
- 8. Dynamic Color Graphics
 - a. The graphics application program shall be supplied as an integral part of the User Interface. Browser or Workstation applications that rely only upon HTML pages shall not be acceptable.
 - b. The graphics applications shall include a create/edit function and a runtime function. The system architecture shall support an unlimited number of graphics documents (graphic definition files) to be generated and executed.
 - 1) The graphics shall be able to display and provide animation based on real-time data that is acquired, derived, or entered.
 - c. Graphics runtime functions - A maximum of 16 graphic applications shall be able to execute at any one time on a user interface or workstation with 4 visible to the user. Each graphic application shall be capable of the following functions:
 - 1) All graphics shall be fully scalable
 - 2) The graphics shall support a maintained aspect ratio.
 - 3) Multiple fonts shall be supported.
 - 4) Unique background shall be assignable on a per graphic basis.
 - 5) The color of all animations and values on displays shall indicate the status of the object attribute.
 - 6) Graphics that represent buildings or systems shall allow natural links and transitions between related detailed tabular views of data that compliment the graphic.
 - d. Operation from graphics - It shall be possible to change values (setpoints) and states in system controlled equipment directly from the graphic.
 - e. Floor Plan graphics - The user interface shall provide graphic applications that summarize conditions on a floor. Floor plan graphics shall indicate thermal comfort using dynamic colors to represent zone temperature deviations from zone setpoint(s). Floor plan graphics shall display overall metrics for each zone in the floor.
 - f. Aliasing - Many graphic displays representing part of a building and various building components are exact duplicates, with the exception that the various variables are bound to different field values. Consequently, it shall be possible to bind the value of a graphic display to aliases, as opposed to the physical field tags.
 - g. Graphic editing tool - A graphic editing tool shall be provided that allows for the creation and editing of graphic files. The graphic editor shall be capable of performing/defining all animations, and defining all runtime binding.
 - 1) The graphic editing tool shall provide a library of standard HVAC equipment, floor plan, lighting, security and network symbols.

- 2) The graphic editing tool shall provide for the creation and positioning of library symbols by dragging from tool bars or drop-downs and positioning where required.
 - 3) The graphics editing tool shall permit the importing of AutoCAD drawings for use in the system.
 - 4) The graphic editing tool shall be able to add additional content to any graphic by importing images in the SVG, PNG or JPG file formats.
9. Historical trending and data collection
 - a. Each Automation Engine shall store trend and point history data for all analog and digital inputs and outputs, as follows:
 - 1) Any point, physical or calculated, may be designated for trending. Two methods of collection shall be allowed:
 - (a) Defined time interval
 - (b) Upon a change of value
 - (c) Each Automation Engine shall have the capability to store multiple samples for each physical point and software variable based upon available memory, including an individual sample time/date stamp. Points may be assigned to multiple history trends with different collection parameters.
 - b. Trend and change of value data shall be stored within the engine and uploaded to a dedicated trend database or exported in a selectable data format via a provided data export utility. Uploads to a dedicated database shall occur based upon one of the following: user-defined interval, manual command, or when the trend buffers are full. Exports shall be as requested by the user or on a time scheduled basis.
10. Trend data viewing and analysis
 - a. Provide a trend viewing utility that shall have access to all database points.
 - b. It shall be possible to retrieve any historical database point for use in displays and reports by specifying the point name and associated trend name.
 - c. The trend viewing utility shall have the capability to define trend study displays to include multiple trends
 - d. Displays shall be able to be single or stacked graphs with on-line selectable display characteristics, such as ranging, color, and plot style.
 - e. Display magnitude and units shall both be selectable by the operator at any time without reconfiguring the processing or collection of data. This is a zoom capability.
 - f. Display magnitude shall automatically be scaled to show full graphic resolution of the data being displayed.
 - g. The Display shall support the user's ability to change colors, sample sizes, and types of markers.
11. Database Management
 - a. Where a separate SQL database is utilized for information storage the System shall provide a Database Manager that separates the database monitoring and managing functions by supporting two separate windows.
 - b. Database secure access shall be accomplished using standard SQL authentication including the ability to access data for use outside of the Building Automation application.
 - c. The database managing function shall include summarized information on trend, alarm, event, and audit for the following database management actions:
 - 1) Backup
 - 2) Purge
 - 3) Restore
 - d. The Database Manager shall support four tabs:
 - 1) Statistics - shall display Database Server information and Trend, Alarm (Event), and Audit information on the Databases.
 - 2) Maintenance - shall provide an easy method of purging records from the Server trend, alarm (event), and audit databases by supporting separate screens for

- creating a backup prior to purging, selecting the database, and allowing for the retention of a selected number of day's data.
- 3) Backup - Shall provide the means to create a database backup file and select a storage location.
 - 4) Restore - shall provide a restricted means of restoring a database by requiring the user to log into an Expert Mode in order to view the Restore screen.
- e. The Status Bar shall appear at the bottom of all Database Manager Tabs and shall provide information on the current database activity. The following icons shall be provided:
- 1) Ready
 - 2) Purging Record from a database
 - 3) Action Failed
 - 4) Refreshing Statistics
 - 5) Restoring database
 - 6) Shrinking a database
 - 7) Backing up a database
 - 8) Resetting internet information Services
 - 9) Starting the Device Manager
 - 10) Shutting down the Device Manager
 - 11) Action successful
- f. The Database Manager monitoring functions shall be accessed through the Monitoring Settings window and shall continuously read database information once the user has logged in.
- g. The System shall provide user notification via taskbar icons and e-mail messages when a database value has exceeded a warning or alarm limit.
- h. The Monitoring Settings window shall have the following sections:
- 1) General - Shall allow the user to set and review scan intervals and start times.
 - 2) Email - Shall allow the user to create and review e-mail and phone text messages to be delivered when a Warning or Alarm is generated.
 - 3) Warning - shall allow the user to define the Warning limit parameters, set the Reminder Frequency, and link the e-mail message.
 - 4) Alarm - shall allow the user to define the Alarm limit parameters, set the Reminder Frequency, and link the e-mail message.
 - 5) Database login - Shall protect the system from unauthorized database manipulation by creating a Read Access and a Write Access for each of the Trend, Alarm (Event) and Audit databases as well as an Expert Mode required to restore a database.
- i. The Monitoring Settings Taskbar shall provide the following informational icons:
- 1) Normal - Indicates by color and size that all databases are within their limits.
 - 2) Warning - Indicates by color and size that one or more databases have exceeded their Warning limit.
 - 3) Alarm - Indicates by color and size that one or more databases have exceeded their Alarm limit.
- j. The System shall provide user notification via Taskbar icons and e-mail messages when a database value has exceeded a warning or alarm limit.

2.04 NETWORK AUTOMATION ENGINES (NAE)

- A. The Network Automation Engine (NAE) shall be a fully user-programmable, supervisory controller. The NAE shall monitor the network of distributed application-specific controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Engines.
- B. Automation network - The NAE shall reside on the automation network and shall support a subnet of system controllers.

- C. User Interface - Each NAE shall have the ability to deliver a web based User Interface (UI) as previously described. All computers connected physically or virtually to the automation network shall have access to the web based UI.
- D. The web based UI software shall be imbedded in the NAE. Systems that require a local copy of the system database on the user's personal computer are not acceptable.
- E. Network Automation Engines supporting 100 or fewer field controllers shall support a minimum of two (2) concurrent users. Network Engines with multiple field buses or supporting more than 100 field controllers shall support a minimum of four (4) concurrent users.
- F. The web based user shall have the capability to access all system data through one NAE.
- G. Remote users connected to the network through an Internet Service Provider (ISP) or telephone dial up shall also have total system access through one NAE.
- H. Systems that require the user to address more than one NAE to access all system information are not acceptable.
- I. The NAE shall have the capability of generating web based UI graphics. The graphics capability shall be imbedded in the NAE.
- J. Systems that support UI Graphics from a central database or require the graphics to reside on the user's personal computer are not acceptable.
- K. The web based UI shall support the following functions:
 - 1. Configuration
 - 2. Commissioning
 - 3. Data Archiving
 - 4. Monitoring
 - 5. Commanding
 - 6. System Diagnostics
 - a. Systems that require workstation software or modified web browsers are not acceptable.
 - b. The NAE shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems.
 - c. Processor - The NAE shall be microprocessor-based with a minimum word size of 32 bits. The NAE shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NAE size and capability shall be sufficient to fully meet the requirements of this Specification.
 - d. Memory - Each NAE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.
 - e. Hardware Real Time Clock - The NAE shall include an integrated, hardware-Based, real-time clock.
 - f. Communications Ports - Network Automation Engines supporting 100 or fewer field controllers shall provide the following ports for operation of operator Input/Output (I/O) devices, such as industry-standard computers, modems, and portable operator's terminals.
 - 1) USB port
 - 2) URS-232 serial data communication port
 - 3) RS-485 port
 - 4) Ethernet port
 - 7. Network Automation Engines with multiple field buses or supporting more than 100 field controllers shall provide the following ports for operation of operator Input/Output (I/O)

devices, such as industry-standard computers, modems, and portable operator's terminals.

- a. Two (2) USB port
 - b. Two (2) URS-232 serial data communication port
 - c. Two (2) RS-485 port
 - d. One (1) Ethernet port
8. Diagnostics - The NAE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Automation Engine shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.
 9. Power Failure - In the event of the loss of normal power, The NAE shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.
 10. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.
 11. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.
 12. Certification - The NAE shall be listed by Underwriters Laboratories (UL).

2.05 NETWORK CONTROL ENGINE (NCE)

- A. The Network Control Engine (NCE) shall meet all of the programming, supervisory and communications requirements of the Network Automation Engine described above plus provide the additional features and capabilities described below.
- B. The Network Control Engine (NCE) shall be a fully user-programmable, digital controller that includes a minimum of 33 I/O points. It shall reside on the automation network and shall support a subnet of 32 Field Controllers
- C. User Interface - Each NCE shall have the ability to deliver a web based User Interface (UI) as previously described for Network Automation Engines.
- D. The NCE shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals as well as four (4) hours per controller per warranty year per controller to re-tune loops according to current system conditions. This time shall be equally divided between the change from heating season to cooling season and back to heating season.
- E. The NCE shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.
- F. The NCE shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
- G. The NCE shall support the following number and types of inputs and outputs:
 1. Ten Universal Inputs - shall be configured to monitor any of the following:
 - a. Analog Input, Voltage Mode
 - b. Analog Input, Current Mode
 - c. Analog Input, Resistive Mode
 - d. Binary Input, Dry Contact Maintained Mode
 - e. Binary Input, Pulse Counter Mode

- f. Eight Binary Inputs - shall be configured to monitor either of the following:
 - g. Dry Contact Maintained Mode
 - h. Pulse Counter Mode
2. Four Analog Outputs - shall be configured to output either of the following
 - a. Analog Output, Voltage Mode
 - b. Analog Output, Current Mode
3. Seven Binary Outputs - shall output the following:
 - a. 24 VAC Triac
4. Four Configurable Outputs - shall be configured to output either of the following:
 - a. Analog Output, Voltage Mode
 - b. Binary Output, 24 VAC Triac Mode
5. The NCE shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus). The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
6. The NCE shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over the Field Trunk or the SA Bus.
7. All Network Control Engines shall be provided with a panel mountable Local Controller Display either as an integral part of the NCE or as a remote device communicating over the SA Bus.
8. The Display shall use a BACnet Standard SSPC-135, clause 9 Master-Slave/Token-Passing protocol and shall allow the user to view monitored points without logging into the system.
9. The Display shall provide password protection with User adjustable password time-out. It shall also allow the user to view and change setpoints, modes of operation, and parameters.
10. The Display shall be menu driven with separate paths for:
 - a. Input/Output
 - b. Parameter/Setpoint
 - c. Overrides
11. The Display shall use easy-to-read English text messages and shall allow the user to select the points to be shown and in what order.
12. The Display shall support a back lit Liquid Crystal Display (LCD) with adjustable contrast and brightness and automatic backlight brightening during user interaction.
13. The display shall be a minimum of 4 lines and a minimum of 20 characters per line
14. The NCE shall be microprocessor-based with a minimum word size of 32 bits. The processor shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NCE size and capability shall be sufficient to fully meet the requirements of this Specification.
15. Each NCE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.
16. The NCE shall employ nonvolatile Flash memory to store all programs and data. The NCE shall employ a data protection battery to save data and power the real time clock when primary power is interrupted.
17. Communications Ports - The NCE shall provide the following ports for operation of operator Input/Output (I/O) devices, such as industry-standard computers, modems, and portable operator's terminals.
 - a. USB port
 - b. RS-232 serial data communication port
 - c. RS-485 port
 - d. RJ-45 Ethernet port
 - e. RJ-12 jack
 - f. The NCE shall support an optional internal modem with RJ-12 6-pin telephone line connector.

18. Diagnostics - The NCE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Control Engine shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.
19. Power Failure - In the event of the loss of normal power, The NCE shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.
20. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.
21. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.
22. Field Controller Bus - The NCE shall support the same communication protocols as described for the Network Engines.

2.06 DDC SYSTEM CONTROLLERS

A. Field Equipment Controller (FEC)

1. The Field Equipment Controller (FEC) shall be a fully user-programmable, digital controller that supports and communicates via BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network. It shall be BACnet Testing Labs (BTL) certified as a BACnet Application Specific Controller (B-ASC) and carry the BTL Label.
2. The FEC shall employ a finite state control engine to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals as well as four (4) hours per warranty year per controller to re-tune loops according to current system conditions. This time shall be equally divided between the change from heating season to cooling season and back to heating season
3. Controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.
4. The FEC shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB. It shall include troubleshooting LED indicators.
5. The FEC shall support the following types of direct wired inputs and outputs:
 - a. Universal Inputs - shall be configured to monitor any of the following:
 - 1) Analog Input, Voltage Mode
 - 2) Analog Input, Current Mode
 - 3) Analog Input, Resistive Mode
 - 4) Binary Input, Dry Contact Maintained Mode
 - 5) Binary Input, Pulse Counter Mode
 - b. Binary Inputs - shall be configured to monitor either of the following:
 - 1) Dry Contact Maintained Mode
 - 2) Pulse Counter Mode
 - c. Analog Outputs - shall be configured to output either of the following:
 - 1) Analog Output, Voltage Mode
 - 2) Analog Output, current Mode
 - d. Binary Outputs - shall output the following:
 - 1) 24 VAC Triac
 - e. Configurable Outputs - shall be capable of the following:
 - 1) Analog Output, Voltage Mode
 - 2) Binary Output Mode
6. The FEC shall have the ability to reside on a Field Controller Bus (FC Bus).

7. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.
8. The FC Bus shall support communications between the FECs and NAE(s) or NCE(s).
9. The FC Bus shall also support Input/Output Module (IOM) communications with the FEC and with the NAE or NCE.
10. The FEC shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus). The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard Protocol SSPC-135, Clause 9.
11. The FEC shall support, but not be limited to, the following applications:
 - a. Optional chilled water/central plant optimization applications
 - b. Heating central plant applications
 - c. Built-up air handling units for special applications
 - d. Terminal & package units
 - e. Special programs as required for systems control
12. The FEC shall support the same Local Controller Display previously described for use with the Network Control Engine. All FEC controllers located indoors serving mechanical equipment other than ceiling hung terminal units shall be provided with their own Local Controller Display.

2.07 FIELD DEVICES

A. Input/Output Module (IOM)

1. The Input/Output Module (IOM) provides additional inputs and outputs for use in the FEC.
2. The IOM shall communicate with the FEC over the FC Bus or the SA Bus.
3. The IOM shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9 on the controller network.
 - a. The IOM shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
 - b. The IOM shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
 - c. A BACnet Protocol Implementation Conformance Statement shall be provided for the FEC.
4. The IOM shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.

B. Networked Thermostat (TEC)

1. The networked thermostat shall be capable of controlling two- or four-pipe fan coils, cabinet unit heaters, reheat coil valves or other similar equipment.
2. The TEC shall communicate over the Field Controller Bus using BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135, Clause 9.
3. The TEC shall be BACnet Testing Labs (BTL) certified and carry the BTL Label.
 - a. The TEC shall be tested and certified as a BACnet Application Specific Controller (B-ASC).
 - b. A BACnet Protocol Implementation Conformance Statement shall be provided for the TEC.
4. The Networked Thermostat shall support remote read/write and parameter adjustment from the web based User Interfaceable through a Network Automation Engine.
5. The Networked Thermostat shall include an intuitive User Interface providing plain text messages.
 - a. Two line, 8 character backlit display
 - b. LED indicators for Fan, Heat, and Cool status
 - c. Five (5) User Interface Keys
 - 1) Mode
 - 2) Fan
 - 3) Override

- 4) Degrees C/F
 - 5) Up/Down
- d. The display shall continuously scroll through the following parameters:
 - 1) Room Temperature
 - 2) System Mode
 - 3) Schedule Status - Occupied/Unoccupied/Override
 - 4) Applicable Alarms
6. The Networked Thermostat shall provide the flexibility to support any one of the following inputs:
 - a. Integral Indoor Air Temperature Sensor
 - b. Duct Mount Air Temperature Sensor
 - c. Remote Indoor Air Temperature Sensor with Occupancy Override and LED Indicator
 - d. Two configurable binary inputs
7. The Networked Thermostat shall provide the flexibility to support any one of the following outputs:
 - a. Three Speed Fan Control
 - b. Two On/Off
 - c. Two Floating
 - d. Two Proportional (0 to 10V)
8. The Networked Thermostat shall provide a minimum of six (6) levels of keypad lockout.
9. The Networked Thermostat shall provide the flexibility to adjust the following parameters:
10. Adjustable Temporary Occupancy from 0 to 24 hours
11. Adjustable heating/cooling deadband from 2° F to 5° F
12. Adjustable heating/cooling cycles per hour from 4 to 8
13. Where required by application and indicated on plans or room schedules provide the Networked Thermostat with an integral Passive Infra-Red (PIR) occupancy sensor.
14. The Networked Thermostat shall employ nonvolatile electrically erasable programmable read-only memory (EEPROM) for all adjustable parameters.

2.08 SYSTEM TOOLS

- A. System Configuration Tool (SCT)
 1. The Configuration Tool shall be a software package enabling a computer platform to be used as a stand-alone engineering configuration tool for a Network Automation Engine (NAE).
 2. The configuration tool shall provide an archive database for the configuration and application data.
 3. The configuration tool shall have the same look-and-feel at the User Interface (UI) regardless of whether the configuration is being done online or offline.
 4. The configuration tool shall include the following features:
 - a. Basic system navigation tree for connected networks
 - b. Integration of Metasys N1, LonWorks, and BACnet enabled devices
 - c. Customized user navigation trees
 - d. Point naming operating parameter setting
 - e. Graphic diagram configuration
 - f. Alarm and event message routing
 - g. Graphical logic connector tool for custom programming
 - h. Downloading, uploading, and archiving databases
 5. The configuration tool shall have the capability to automatically discover field devices on connected buses and networks. Automatic discovery shall be available for the following field devices:
 - a. BACnet Devices
 - b. LonWorks devices
 6. The configuration tool shall be capable of programming the Field Equipment Controllers.

- a. The configuration tool shall provide the capability to configure, simulate, and commission the Field Equipment Controllers.
- b. The configuration tool shall allow the FECs to be run in Simulation Mode to verify the applications.
- c. The configuration tool shall contain a library of standard applications to be used for configuration.
7. The configuration tool shall be capable of programming the field devices.
 - a. The configuration tool shall provide the capability to configure, simulate, and commission the field devices.
 - b. The configuration tool shall allow the field devices to be run in Simulation Mode to verify the applications.
 - c. The configuration tool shall contain a library of standard applications to be used for configuration
8. A wireless access point shall allow a wireless enabled portable PC to make a temporary Ethernet connection to the automation network.
 - a. The wireless connection shall allow the PC to access configuration tool through the web browser using the User Interface (UI).
 - b. The wireless use of configuration tool shall be the same as a wired connection in every respect.
 - c. The wireless connection shall use the Bluetooth Wireless Technology.

2.09 INPUT DEVICES

A. General Requirements

1. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.

B. Temperature Sensors

1. General Requirements:
 - a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.
 - b. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD.
 - c. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion:

Point Type	Accuracy
Accuracy	+/- .5°F
Room Temp	+/- .5°F
Duct Temperature	+/- .5°F
All Others	+/- .75°F

2. Room Temperature Sensors
 - a. Room sensors shall be constructed for either surface or wall box mounting.
 - b. Room sensors shall have the following options:
 - 1) Setpoint reset slide switch providing a +3 degree (adjustable) range.
 - 2) A momentary override request push button for activation of after-hours operation.
3. Room Temperature Sensors with Integral Display
 - a. Room sensors shall have an integral display when specified in the sequence of operations or elsewhere in these documents.
4. Thermo wells
 - a. When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting.

- b. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure.
 - c. Thermo wells and sensors shall be mounted in a threadolet or 1/2" NPT saddle and allow easy access to the sensor for repair or replacement.
 - d. Thermo wells shall be constructed of 316 stainless steel.
- 5. Outside Air Sensors
 - a. Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield.
 - b. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.
 - c. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.
- 6. Duct Mount Sensors
 - a. Duct mount sensors shall mount in an electrical box through a hole in the duct, and be positioned so as to be easily accessible for repair or replacement.
 - b. Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate.
 - c. For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be used.
- 7. Averaging Sensors
 - a. For ductwork greater in any dimension than 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.
 - b. For plenum applications, such as mixed air temperature measurements, a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.
 - c. Capillary supports at the sides of the duct shall be provided to support the sensing string.
- C. Humidity Sensors
 - 1. The sensor shall be a solid-state type, relative humidity sensor of the Bulk Polymer Design. The sensor element shall resist service contamination.
 - 2. The humidity transmitter shall be equipped with non-interactive span and zero adjustments, a 2-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.
 - 3. The humidity transmitter shall meet the following overall accuracy, including lead loss and Analog to Digital conversion. 3% between 20% and 80% RH @ 77 Deg F unless specified elsewhere.
 - 4. Outside air relative humidity sensors shall be installed with a rain proof, perforated cover. The transmitter shall be installed in a NEMA 3R enclosure with sealtite fittings and stainless steel bushings.
 - 5. A single point humidity calibrator shall be provided, if required, for field calibration. Transmitters shall be shipped factory pre-calibrated.
 - 6. Duct type sensing probes shall be constructed of 304 stainless steel, and shall be equipped with a neoprene grommet, bushings, and a mounting bracket.
- D. Differential Pressure Transmitters
 - 1. General Air and Water Pressure Transmitter Requirements:
 - a. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.
 - b. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.
 - c. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high

- and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.
- d. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.
 2. Building Differential Air Pressure Applications (-1" to +1" w.c.)
 - a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
 - b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
 - 1) -1.00 to +1.00 w.c. input differential pressure ranges. (Select range appropriate for system application)
 - 2) 4-20 mA output.
 - 3) Maintain accuracy up to 20 to 1 ratio turndown.
 - 4) Reference Accuracy: +0.2% of full span.
 3. Low Differential Air Pressure Applications (0" to 5" w.c.)
 - a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
 - b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
 - 1) (0.00 - 1.00" to 5.00") w.c. input differential pressure ranges. (Select range appropriate for system application.)
 - 2) 4-20 mA output.
 - 3) Maintain accuracy up to 20 to 1 ratio turndown.
 - 4) Reference Accuracy: +0.2% of full span.
- E. Status and Safety Switches
1. General Requirements
 - a. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the BMS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.
 2. Current Sensing Switches
 - a. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.
 - b. Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.
 - c. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.
 3. Air Filter Status Switches
 - a. Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.
 - b. A complete installation kit shall be provided, including: static pressure tops, tubing, fittings, and air filters.
 - c. Provide appropriate scale range and differential adjustment for intended service.
 4. Air Flow Switches

- a. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.
- 5. Air Pressure Safety Switches
 - a. Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120VAC.
 - b. Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.
- 6. Low Temperature Limit Switches
 - a. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.
 - b. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.
 - c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.
 - d. The low temperature limit switch shall be equal to Johnson Controls A70.

2.10 OUTPUT DEVICES

- A. Actuators
 - 1. General Requirements
 - a. Damper and valve actuators shall be electronic and/or pneumatic, as specified in the System Description section.
 - 2. Electronic Damper Actuators
 - a. Electronic damper actuators shall be direct shaft mount.
 - b. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized Based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction, and a gear release to allow manual positioning.
 - c. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
 - d. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and other dampers, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as "quick acting," shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.
 - 3. Electronic Valve Actuators
 - a. Electronic valve actuators shall be manufactured by the valve manufacturer.
 - b. Each actuator shall have current limiting circuitry incorporated in its design to prevent damage to the actuator.
 - c. Modulating and two-position actuators shall be provided as required by the sequence of operations. Actuators shall provide the minimum torque required for proper valve

close-off against the system pressure for the required application. The valve actuator shall be sized Based on valve manufacturer's recommendations for flow and pressure differential. All actuators shall fail in the last position unless specified with mechanical spring return in the sequence of operations. The spring return feature shall permit normally open or normally closed positions of the valves, as required. All direct shaft mount rotational actuators shall have external adjustable stops to limit the travel in either direction.

- d. Modulating Actuators shall accept 24 VAC or VDC and 120 VAC power supply and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
- e. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Butterfly isolation and other valves, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop the associated pump or chiller.

B. Control Valves

- 1. All automatic control valves shall be fully proportioning and provide near linear heat transfer control. The valves shall be quiet in operation and fail-safe open, closed, or in their last position. All valves shall operate in sequence with another valve when required by the sequence of operations. All control valves shall be sized by the control manufacturer, and shall be guaranteed to meet the heating and cooling loads, as specified. All control valves shall be suitable for the system flow conditions and close against the differential pressures involved. Body pressure rating and connection type (sweat, screwed, or flanged) shall conform to the pipe schedule elsewhere in this Specification.
- 2. Chilled water control valves shall be modulating plug, ball, and/or butterfly, as required by the specific application. Modulating water valves shall be sized per manufacturer's recommendations for the given application. In general, valves (2 or 3-way) serving variable flow air handling unit coils shall be sized for a pressure drop equal to the actual coil pressure drop, but no less than 5 PSI. Valves (3-way) serving constant flow air handling unit coils with secondary circuit pumps shall be sized for a pressure drop equal to 25% the actual coil pressure drop, but no less than 2 PSI. Mixing valves (3-way) serving secondary water circuits shall be sized for a pressure drop of no less than 5 PSI. Valves for terminal reheat coils shall be sized for a 2 PSIG pressure drop, but no more than a 5 PSI drop.
- 3. Ball valves shall be used for hot and chilled water applications, water terminal reheat coils, radiant panels, unit heaters, package air conditioning units, and fan coil units except those described hereinafter.
- 4. Modulating plug water valves of the single-seat type with equal percentage flow characteristics shall be used for all special applications as indicated on the valve schedule. Valve discs shall be composition type. Valve stems shall be stainless steel.
- 5. Butterfly valves shall be acceptable for modulating large flow applications greater than modulating plug valves, and for all two-position, open/close applications. In-line and/or three-way butterfly valves shall be heavy-duty pattern with a body rating comparable to the pipe rating, replaceable lining suitable for temperature of system, and a stainless steel vane. Valves for modulating service shall be sized and travel limited to 50 degrees of full open. Valves for isolation service shall be the same as the pipe. Valves in the closed position shall be bubble-tight.

C. Electronic Signal Isolation Transducers

- 1. A signal isolation transducer shall be provided whenever an analog output signal from the BMS is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input signal from a remote system.
- 2. The signal isolation transducer shall provide ground plane isolation between systems.

3. Signals shall provide optical isolation between systems.

2.11 MISCELLANEOUS DEVICES

A. Local Control Panels

1. All control panels shall be factory constructed, incorporating the BMS manufacturer's standard designs and layouts. All control panels shall be UL inspected and listed as an assembly and carry a UL 508 label listing compliance. Control panels shall be fully enclosed, with perforated sub-panel, hinged door, and slotted flush latch.
2. In general, the control panels shall consist of the DDC controller(s), display module as specified and indicated on the plans, and I/O devices-such as relays, transducers, and so forth-that are not required to be located external to the control panel due to function. Where specified the display module shall be flush mounted in the panel face unless otherwise noted.
3. All I/O connections on the DDC controller shall be provide via removable or fixed screw terminals.
4. Low and line voltage wiring shall be segregated. All provided terminal strips and wiring shall be UL listed, 300-volt service and provide adequate clearance for field wiring.
5. All wiring shall be neatly installed in plastic trays or tie-wrapped.
6. A 120 volt convenience outlet, fused on/off power switch, and required transformers shall be provided in each enclosure.

PART 3 - PERFORMANCE/EXECUTION

3.01 BMS SPECIFIC REQUIREMENTS

A. Graphic Displays

1. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.
2. User shall access the various system schematics via a graphical penetration scheme and/or menu selection. .

B. Remote Access:

1. The Owner shall be provided the ability to use a smart device such as a tablet PC or smart phone, to remotely monitor and control the BMS system. Provide unique login passwords to limit the remote user to the AC unit associated with his/her space within the building.

3.02 INSTALLATION PRACTICES

A. BMS Wiring

1. All conduit, wiring, accessories and wiring connections required for the installation of the Building Management System, as herein specified, shall be provided by the BMS Contractor unless specifically shown on the Electrical Drawings under Division 16 Electrical. All wiring shall comply with the requirements of applicable portions of Division 16 and all local and national electric codes, unless specified otherwise in this section.
2. All BMS wiring materials and installation methods shall comply with BMS manufacturer recommendations.
3. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the BMS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the BMS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
4. Class 2 Wiring
 - a. All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.

SECTION 230923 - AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION
SYSTEM H2M

- b. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5' from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.
 5. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.
 6. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.
- B. BMS Line Voltage Power Source
 1. 120-volt AC circuits used for the Building Management System shall be taken from panel boards and circuit breakers provided by Division 16.
 2. Circuits used for the BMS shall be dedicated to the BMS and shall not be used for any other purposes.
 3. DDC terminal unit controllers may use AC power from motor power circuits.
- C. BMS Raceway
 1. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 3/4".
 2. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect.
 3. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
 4. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.
- D. Penetrations
 1. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways.
 2. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.
 3. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.
 4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.
- E. BMS Identification Standards
 1. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.
 - a. Cable types specified in Item A shall be color coded for easy identification and troubleshooting.
- F. BMS Panel Installation
 1. The BMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.
 2. The BMS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.
- G. Input Devices
 1. All Input devices shall be installed per the manufacturer recommendation
 2. Locate components of the BMS in accessible local control panels wherever possible.
- H. HVAC Input Devices - General

SECTION 230923 - AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION
SYSTEM **H2M**

1. All Input devices shall be installed per the manufacturer recommendation
 2. Locate components of the BMS in accessible local control panels wherever possible.
 3. The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.
 4. Outside Air Sensors
 - a. Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outside air conditions accurately.
 - b. Sensors shall be installed with a rain proof, perforated cover.
 5. Building Differential Air Pressure Applications (-1" to +1" w.c.):
 - a. Transmitters exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.
 - b. The interior tip shall be inconspicuous and located as shown on the drawings.
 6. Duct Temperature Sensors:
 - a. Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.
 - b. The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.
 - c. For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.
 - d. The sensor shall be mounted to suitable supports using factory approved element holders.
 7. Space Sensors:
 - a. Shall be mounted per ADA requirements.
 - b. Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.
 8. Low Temperature Limit Switches:
 - a. Install on the discharge side of the first water or steam coil in the air stream.
 - b. Mount element horizontally across duct in a serpentine pattern insuring each square foot of coil is protected by 1 foot of sensor.
 - c. For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.
 9. Air Differential Pressure Status Switches:
 - a. Install with static pressure tips, tubing, fittings, and air filter.
 10. Water Differential Pressure Status Switches:
 - a. Install with shut off valves for isolation.
- I. HVAC Output Devices
1. All output devices shall be installed per the manufacturers recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.
 2. Actuators: All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke.
 3. Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.
 4. Control Valves: Shall be sized for proper flow control with equal percentage valve plugs. The maximum pressure drop for water applications shall be 5 PSI. The maximum pressure drop for steam applications shall be 7 PSI.

3.03 TRAINING

- A. The BMS contractor shall provide the following training services:

SECTION 230923 - AUTOMATIC TEMPERATURE CONTROLS AND BUILDING AUTOMATION
SYSTEM **H2M**

1. Forty (40) hours of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the BMS software layout and naming conventions, and a walk through of the facility to identify panel and device locations.

3.04 COMMISSIONING

- A. Fully commission all aspects of the Building Management System work.
- B. Acceptance Check Sheet
 1. Prepare a check sheet that includes all points for all functions of the BMS as indicated on the point list included in this specification.
 2. Submit the check sheet to the Engineer for approval
 3. The Engineer will use the check sheet as the basis for acceptance with the BMS Contractor.
- C. Promptly rectify all listed deficiencies and submit to the Engineer that this has been done.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The work specified as part of this Section consists of the integration of equipment controls supplied as part of manufactured items, materials and equipment required by the Drawings and under Divisions 23 and 26 to achieve operational and coordinated Sequences of Operation as Specified. Work shall include management of the system start up and operational check out, coordination of functions of controllers supplied as part of equipment packages, sizing of control valves and damper operators for dampers, interconnection of systems, provision and installation of all accessory devices required for complete system operation including dampers, control valves and actuators not provided as part of equipment, coordination of start up and testing and demonstration of the operation of Sequences of Operation to the Owner and his representatives.

1.02 RELATED SECTIONS

- A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of these Specifications and shall be used in conjunction with this Section as a part of the Contract Documents. Consult them for further instructions pertaining to this work. The Contractor is bound by the provisions of Division 00 and Division 01.
- B. The following Sections constitute related work:
 - 1. Section 230010 - General Mechanical Requirements
 - 2. Equipment and Systems specified under Division 23
 - 3. Division 26

1.03 QUALITY ASSURANCE

- A. System Installer Qualifications
 - 1. The Integrator shall have a minimum of five years experience in the integration of systems of a similar nature to those of this Project.
 - 2. The Integrator shall have an office within 50 miles of the project site and provide 24-hour response in the event of a customer call.
- B. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.
 - 1. Underwriters Laboratories: Products shall be UL-916-PAZX listed.
 - 2. National Electrical Code - NFPA 70.
- C. All products used in this installation shall be new, currently under manufacture, and shall have been applied in similar installations for a minimum of 2 years. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's representative in writing prior to bid date. Spare parts shall be available for at least 5 years after completion of this Contract.

1.04 SUBMITTALS

- A. Submit at the time of bid the name and qualifications of the firm that will be responsible for the Integration function along with the qualifications of the specific personnel proposed. The Owner and Architect may choose to interview the personnel proposed for the project.
- B. Contractor shall provide shop drawings and manufacturer's standard specification data sheets on all materials and hardware to be provided. No work may begin on any segment of this project until the Architect and Owner have reviewed submittals for conformity with the Drawings

and Specifications. All shop drawings shall be provided to the Owner electronically as .dwg or .dxf file formats.

- C. Submit a written sequence of operation for each system indicating which functions are to be controlled by controls provided as part of manufactured equipment and which functions will be under control of devices provided as part of this Section.
- D. Submit interconnecting wiring diagrams for all systems. These diagrams may rely on diagrams for controls of manufactured equipment provided that the interface points are clearly identified and copies of the manufactured item's control diagrams are submitted for information as part of the submittal package.
- E. Submit any additional information or data which is deemed necessary to determine compliance with these specifications or which is deemed valuable in documenting the system to be installed.
- F. Submit the following within 30 days of contract award:
 - 1. A work plan and schedule for the start up and check out of all systems including time requirements and resources required from all Sub-Contractors involved.
 - 2. A complete list of equipment to be used indicating quantity, manufacturer and model number.
 - 3. A schedule of all control valves including the valve size, model number (including pattern and connections), flow, CV, pressure rating, and location.
 - 4. A schedule of all control dampers. This shall include the damper size, pressure drop, manufacturer and model number.
 - 5. Provide manufacturers cut sheets for major system components. When manufacturer's cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawings shall clearly reference the specification and/or drawing that the submittal is being submitted to cover.
 - 6. The submittals required under this Section shall be considered as For Information Only. Review by the Architect shall not relieve the Contractor from the responsibility of providing fully operational systems.

1.05 WARRANTY

- A. Warrant all work as follows:
 - 1. Labor & materials for control system specified shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. Control System failures during the warranty period shall be adjusted, repaired, or replaced at no charge or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during customary business hours.
 - 2. At the end of the final start-up/testing, if equipment and systems are operating in a manner satisfactory to the Owner and Architect, the Owner shall sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this Specification. The date of Owner's acceptance shall be the start of warranty.

PART 2 - PRODUCTS

2.01 STANDARD OF QUALITY AND PERFORMANCE

- A. Products specified are not intended to form a complete scope of supply. They are intended to set a level of quality for items that the Contractor may need to supply to implement a complete Sequence of Operation. Products of a comparable quality and performance may be submitted for approval by the Architect.

2.02 MOTORIZED DAMPERS

- A. Dampers shall be modulating double-acting opposed blade or parallel blade dampers as required, designed and tested in accordance with AMCA 500, and meeting current energy code. Obtain and verify the location, size and pressure rating of each damper prior to fabrication and delivery. Verify the layout of equipment and ductwork before dampers are fabricated. Pressure drop shall not exceed 0.03 inches water gauge static pressure at 1000 fpm in the fully-open position, and shall be rated for at least 2000 fpm average velocity. Damper shut-off pressure rating shall exceed the fan maximum total head-pressure.
- B. Dampers shall be constructed of extruded aluminum or at least No. 16 gauge galvanized steel, with each blade being not more than 8 inches; wide damper frame channel shall be at least 5 inches deep. Each blade end shall have a 3/8 inch stainless steel or plated steel shaft rotating in self-lubricating bearings mounted in a damper channel frame. Blades mounted vertically shall be supported by thrust bearings. Control shaft shall be at least 1/2 inch diameter.
- C. Flat-steel damper blades shall be made rigid by folding the edges. Blades shall have interlocking edges and shall be provided with EPDM or neoprene compressible seals at point of contact. Foam seals are not acceptable. Provide compression-type stainless steel jamb seals continuously along blade edges.
- D. Each damper shall be assembled in the manufacturer's shop as a complete unit. Dampers, when closed, shall be guaranteed by the manufacturer not to leak in excess of 20 cfm per square foot at 4 inches w.g. static pressure. Provide dampers with operators having sufficient power to limit leakage to the rate specified.
- E. Damper seals shall be suitable for an operating range of minus 20 degrees F (or 20 degrees F below the heating outside design temperature, whichever is lower) at the lower end to 200 degrees F at the upper end.
- F. A complete damper assembly shall have blades no longer than 48 inches and no higher than 48 inches. Where greater length or height is required, the assembly shall be made of a combination of sections. Dampers shall be sized for the required air velocity and pressure classification.
- G. Approved Manufacturers: Greenheck (VDC-23), Arrow or approved equal.

2.03 ELECTRONIC DAMPER/VALVE ACTUATORS

- A. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
- B. For power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing.
 - 1. Damper actuators shall fail normally open or closed as described on the Drawings or as follows:
 - a. Outdoor Air Intake - normally closed.
 - b. Air Exhaust - normally closed.
 - c. Other applications - as required by the Sequence of Operation.
- C. All rotary spring return actuators shall be capable of both clockwise and counter clockwise spring return operation.
- D. Proportional actuators shall accept a 0-10 VDC or 0-20 ma control signal and provide a 2-10 VDC or 4-20 ma operating range.

- E. All 24 VAC/DC actuators shall operate on Class 2 wiring and shall not require more than 10 VA for AC or more than 8 W for DC applications. Actuators operating on 120 VAC or 230 VAC shall not required more than 11 VA.
- F. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb. torque capacity shall have a manual crank for this purpose.
- G. Actuators shall be provided with a conduit fitting and a minimum 1 meter electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.
- H. All modulating actuators shall have an external, built-in switch to allow the reversing of direction of rotation
- I. Actuators shall be Underwriters Laboratories Standard 873 listed.
- J. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque.
- K. Provide a single damper actuator when dampers are less than 4 feet in width. Otherwise provide two damper actuators (one on each side of the ductwork).

2.04 CONTROL VALVES

- A. Control valves shall be two-way or three-way type for two-position or modulating service as required.
- B. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
 - 1. Steam Valves: 150% of operating (inlet) pressure.
- C. Valve Failure Position:
 - 1. Valves shall fail normally open or closed as indicated on the Drawings or as follows:
 - a. Heating coils in air handlers - normally open.
 - b. Chilled water control valves - normally closed
 - c. Other applications - as scheduled or as required by Sequence of Operation.
 - 2. Zone valves shall be sized to meet the control application and they shall maintain their last position in the event of a power failure.
- D. Steam Valves:
 - 1. Body and trim materials shall be as specified in "Pipe, Valve & Fittings" specification. Linear ports for modulating service.
 - 2. Sizing Criteria:
 - a. Two-position service: pressure drop 10% to 20% of inlet pressure (psig).
 - b. Modulating service 15 psig or less: pressure drop 80% of inlet pressure (psig).
 - c. Modulating service 16 psig to 50 psig: pressure drop as scheduled on plans.
 - d. In all cases above the contractor shall verify sizing criteria with the valve manufacturer.

2.05 TEMPERATURE SENSORS

- A. Temperature sensors shall be Resistance Temperature Device (RTD) or Thermistor.

- B. Duct sensors shall be rigid or averaging as required. Averaging sensors shall be a minimum of 5 feet in length.
- C. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.
- D. Space sensors shall be equipped with set-point adjustment, override switch, display, and communication port.
- E. Provide matched temperature sensors for differential temperature measurement. Differential accuracy shall be within 0.2 degrees F.
- F. The space temperature, setpoint, and override confirmation shall be annunciated by a digital display for each zone sensor. The setpoint shall be selectable utilizing buttons.

2.06 HUMIDITY SENSORS

- A. Room Humidity sensors shall have an accuracy of $\pm 1\%$ 25°C from 10% to 80% RH with One-point adjustment calibration. The operating temperature range shall be -10° to 150°F max.
- B. Duct sensors shall have a sensing range of 20% to 80% with accuracy of $\pm 1\%$ R.H. Duct sensors shall be provided with a sampling chamber.
- C. Outdoor air humidity sensors shall have a sensing range of 20% to 95% R.H. and shall be suitable for ambient conditions of -40 degrees F to 170 degrees F.
- D. Humidity sensor's drift shall not exceed 1% of full scale per year.

2.07 STATIC PRESSURE SENSORS

- A. Sensor shall have linear output signal. Zero and span shall be field-adjustable.
- B. Sensor sensing elements shall withstand continuous operating conditions plus or minus 50% greater than calibrated span without damage.
- C. Water pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Sensor shall be complete with 4-20 ma output, required mounting brackets, and block and bleed valves. Mount in location accessible for service.
- D. Water differential pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (DP) and maximum static pressure shall be 3,000 psi. Transmitter shall be complete with 4-20 ma output, required mounting brackets, and five-valve manifold. Mount in a location accessible for service.

2.08 LOW LIMIT THERMOSTATS

- A. Safety low limit thermostats shall be vapor pressure type with an element 20 ft minimum length. Element shall respond to the lowest temperature sensed by any one foot section.

2.09 FLOW SWITCHES

- A. Flow-proving switches shall be either paddle or differential pressure type, as shown on the Drawings or as specified.

- B. Paddle type switches (water service only) shall be UL listed, SPDT snap-acting with pilot duty rating (125 VA minimum). Adjustable sensitivity with NEMA 1 Type enclosure unless otherwise specified:
- C. Differential pressure type switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 Type enclosure, with scale range and differential suitable for intended application, or as specified.
- D. Current sensing relays may be used for flow sensing or terminal devices.

2.10 RELAYS

- A. Control relays shall be UL listed plug-in type with dust cover. Contact rating, configuration, and coil voltage suitable for application.
- B. Time delay relays shall be UL listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable plus or minus 200% (minimum) from set-point shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 Type enclosure when not installed in local control panel.

2.11 TRANSFORMERS AND POWER SUPPLIES

- A. Control transformers shall be UL listed, Class 2 current-limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.
- B. Unit output shall match the required output current and voltage requirements. Current output shall allow for a 50% safety factor. Output ripple shall be 3.0 mV maximum Peak-to-Peak. Regulation shall be 0.10% line and load combined, with 50 microsecond response time for 50% load changes. Unit shall have built-in over-voltage protection.
- C. Unit shall operate between 0 degrees C and 50 degrees C.
- D. Unit shall be UL recognized.

2.12 CURRENT SWITCHES

- A. Current-operated switches shall be self-powered, solid state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the control system.

2.13 LOCAL CONTROL PANELS

- A. All indoor control cabinets shall be fully enclosed NEMA 1 or NEMA 4 rating as required. Provide cabinet with hinged door, key-lock latch, and removable sub-panels. A single key shall be common to all field panels and sub-panels.
- B. Interconnections between internal and face-mounted devices pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.
- C. Provide on/off power switch with over-current protection and main air gauge for control power sources to each local panel.

2.14 AIR FLOW MEASURING STATIONS

- A. Air flow measuring stations shall be multi-point, multi-axis flow ring or cross sensor. Single point or flow bar sensors are not acceptable. The airflow measurement station shall measure from 15 percent to 100 percent of unit nominal airflow. The air flow measuring station shall adjust for temperature variations and shall provide a 2 to 10 Vdc signal that corresponds to actual airflow for controlling and documenting airflow. The accuracy of the airflow measurement station shall be ± 5 percent.
- B. Air flow measuring stations shall be provided by the air handler manufacturer or the VAV box manufacturer. See air handler or VAV box specification section for more details.

2.15 WALL MOUNTED CARBON DIOXIDE SENSORS

- A. Carbon dioxide sensors shall be of the wall mounted type.
- B. Sensors shall be of the auto-calibrated type designed to operate from 24VAC or 24VDC power.
- C. Range: 0-2000 ppm CO₂
- D. Accuracy: ± 30 ppm CO₂ + 3% of reading
- E. Annual Zero Drift: ± 10 ppm
- F. Response Time: < 3 minutes
- G. Output Signals:
 - 1. 0-10 VDC
 - 2. 4-10 mA or 2-10 VDC
- H. Resolution of Analog Outputs: 2 ppm CO₂
- I. Housing Material: Polycarbonate/ABS blend
- J. The space temperature, setpoint, and override confirmation shall be annunciated by a digital display for each zone sensor. The setpoint shall be selectable utilizing buttons.

PART 3 - EXECUTION

3.01 GENERAL WORKMANSHIP

- A. Install equipment, piping, wiring/conduit parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.
- B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
- C. Install all equipment in readily accessible location as defined by Chapter 1 Article 100 part A of the NEC. Control panels shall be attached to structural walls unless mounted in equipment enclosure specifically designed for that purpose. Panels shall be mounted to allow for unobstructed access for service.
- D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.
- E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.02 WIRING

- A. All control and interlock wiring shall comply with the national and local electrical codes and Division 26 of these Specifications. Where the requirements of this Section differ with those in Division 26, the requirements of this Section shall take precedence.
- B. Do not install Class 2 wiring in conduit containing Class 1 wiring. Do not use boxes and panels containing high voltage for low voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).
- C. Control wiring located in a plenum space that is not installed in a conduit shall be plenum rated.
- D. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal blocks, or with a crimped connector. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.
- E. Maximum allowable voltage for control wiring shall be 120V. Provide and install step down transformers.
- F. All wiring shall be installed as continuous lengths, where possible. Any required splices shall be made only within an approved junction box or other approved protective device.
- G. Maintain fire rating at all penetrations in accordance with other Sections of this Specification and local codes.
- H. Size of conduit and size and type of wire shall be the design responsibility of the Contractor, in keeping with the manufacturer's recommendations and the NEC.
- I. Locate control and status relays in designated enclosures only. These relays may also be located within packaged equipment control panel enclosures. These relays shall not be located within Class 1 starter enclosures.
- J. Follow manufacturer's installation recommendations for all communication and network cabling. Network or communication cabling shall be run separately from other wiring.
- K. Adhere to Division 26 requirements for installation of raceway.
- L. Maintain an updated (as-built) wiring diagram with terminations identified at the job site.
- M. Flexible metal conduits and liquid-tight, flexible metal conduits shall not exceed 3feet in length and shall be supported at each end. Flexible metal conduit less than 1/2" electrical trade size shall not be used. In areas exposed to moisture liquid tight, flexible metal conduits shall be used.

3.03 INSTALLATION OF SENSORS

- A. Install sensors in accordance with the manufacturer's recommendations.
- B. Mount sensors rigidly and adequate for the environment within which the sensor operates.
- C. Room temperature sensors shall be installed on concealed junction boxes properly supported by the wall framing.
- D. All wires attached to sensors shall be air sealed in their conduits or in the wall to stop air transmitted from other areas affecting sensor readings.

- E. Install duct static pressure tap with tube end facing directly down-stream of air flow.
- F. Sensors used in mixing plenums, and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip.
- G. All pipe mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat conducting fluid in thermal wells.
- H. Wiring for space sensors shall be concealed in building walls. EMT conduit is acceptable within mechanical and service rooms.
- I. Install outdoor air temperature sensors on north wall complete with sun shield at designated location.

3.04 FLOW SWITCH INSTALLATION

- A. Install using a thread-o-let in steel pipe. In copper pipe use C x C x F Tee, no pipe extensions or substitutions allowed.
- B. Mount a minimum of 5 pipe diameters upstream and 5 pipe diameters downstream or 2 feet which ever is greater, from fittings and other obstructions.
- C. Install in accordance with manufacturers' instructions.
- D. Assure correct flow direction and alignment.
- E. Mount in horizontal piping - flow switch on top of the pipe.

3.05 ACTUATOR INSTALLATION

- A. Mount and link control damper actuators per manufacturer's instructions.
- B. To compress seals when spring return actuators are used on normally closed dampers, power actuator to approximately 5 degrees open position, manually close the damper, and then tighten the linkage.
- C. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
- D. Valves - Actuators shall be mounted on valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following manufacturer's recommendations.

3.06 WARNING LABELS

- A. Affix plastic labels on each starter and equipment automatically controlled. Label shall indicate the following:

CAUTION

This equipment is operating under automatic control and may start at any time without warning.

3.07 IDENTIFICATION OF HARDWARE AND WIRING

- A. All wiring and cabling, including that within factory-fabricated panels, shall be labeled at each end within 2 inches of termination with a cable identifier and other descriptive information.
- B. Permanently label or code each point of field terminal strips to show the instrument or item served.
- C. Identify control panels with minimum 1-cm letters on laminated plastic nameplates.
- D. Identify all other control components with permanent labels. Identifiers shall match record documents. All plug-in components shall be labeled such that removal of the component does not remove the label.

3.08 CLEANING

- A. The Contractor shall clean up all debris resulting from his or her activities daily. The contractor shall remove all cartons, containers, crates, etc. under his control as soon as their contents have been removed. Waste shall be collected and placed in a location designated by the Construction Manager or General Contractor.
- B. At the completion of work in any area, the Contractor shall clean all of his/her work, equipment, etc., making it free from dust, dirt and debris, etc.
- C. At the completion of work, all equipment furnished under this Section shall be checked for paint damage, and any factory finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.09 PROTECTION

- A. The Contractor shall protect all work and material from damage by his/her work or workers, and shall be liable for all damage thus caused.
- B. The Contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The Contractor shall protect his/her work against theft or damage, and shall carefully store material and equipment received on site that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.10 FIELD QUALITY CONTROL

- A. All work, materials and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this Section.
- B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship. All visible piping and or wiring runs shall be installed parallel to building lines and properly supported.
- C. Contractor shall arrange for field inspections by local and/or state authorities having jurisdiction over the work.

3.11 ACCEPTANCE

- A. The control systems will not be accepted as meeting the requirements of completion until all tests described in this Specification have been performed to the satisfaction of both the Engineer and Owner.
- B. The full range of operation for all Sequences of Operation shall be demonstrated. Where sequences are dependent on season or outside conditions these conditions may be simulated for the purpose of demonstration if approved by both the Architect and the Owner. If simulations cannot be acceptably created the Contractor shall perform the demonstration during the proper period.
- C. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Owner's representative. Such tests shall then be performed as part of the warranty.

END OF SECTION

SECTION 230993 - SEQUENCE OF OPERATIONS^{H2M}

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The Work specified as part of this Section consists of the work required to achieve operational and coordinated Sequences of Operation as described. Work includes coordination of functions of controllers supplied as part of equipment packages, sizing of control valves, interconnection of systems, provision and installation of all accessory devices required for complete system operation including devices not provided as part of equipment, coordination of start up and testing and demonstration of the operation of Sequences of Operation to the Owner and his representatives.
- B. The control system operation of all equipment shall be subject to the operational modes, conditions and logic described in this Section and the controlled equipment manufacturer's recommendations.
- C. Training of the Owner's personnel in the operation, trouble shooting, adjustment and repair of all system controls.

1.02 RELATED SECTIONS AND WORK

- A. Section 230923 - Automatic Temperature Controls and Building Automation System
- B. Section 230991 - Instrumentation and Control Integration
- C. Division 26 - Electrical Specifications
- D. Owner's Building Management System (BMS)
- E. Owner's Fire Alarm System (FAS)

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL

- A. General
 - 1. Conform to the requirements of the Owner's standards for all electrical work and devices.
 - 2. System and system components shall be BACNet compatible.
 - 3. All set points and operating points shall be able to be transmitted to and set from the BMS system. Specific points to be enabled shall be at the discretion of the Owner.
 - 4. All systems shall be capable of operating independently of the BMS system based on set points and limits either input from the BMS system or manually.
 - 5. Coordinate all work with the requirements and characteristics of the BMS system and the equipment provided for the project under this phase or earlier phases.
 - 6. All space sensors and thermostats shall have an LCD display indicating their set point, the condition sensed and the mode of operation they are responding to.
 - 7. All equipment to be integrated with the BMS shall be fully integrated with new or existing facility controls and devices including interlocks, icons, graphics, read-outs and reports.

3.02 SEQUENCE OF OPERATION - CABINET UNIT HEATER, CUH-1 TO 3

- A. General:

SECTION 230993 - SEQUENCE OF OPERATIONS^{H2M}

1. Each cabinet unit heater shall be provided with a unit mounted thermostat.
- B. Heating:
 1. The heating set point temperature shall be 68 degrees. When the space temperature falls below the set point temperature, the cabinet unit heater shall turn on in order to maintain the set point temperature.

3.03 SEQUENCE OF OPERATION - DUCTLESS SPLIT SYSTEM, CU-1 TO 10, EU-1 TO 3

- A. General:
 1. Each ductless split system shall be provided with a wall mounted digital thermostat. See floor plan drawings and schedule for outdoor condensing units that serve multiple indoor units.
- B. Cooling:
 1. The cooling set point temperature shall be 75 degrees F (adjustable). Upon a demand for mechanical cooling, the associated condensing unit shall be energized and the cooling coil shall be controlled to maintain space temperature.
- C. Heating:
 1. The heating set point temperature shall be 70 degrees F (adjustable). When the space temperature falls below the set point temperature the heating unit shall stage on in order to maintain the set point temperature.

3.04 SEQUENCE OF OPERATION - EXHAUST FANS, EF-1 TO 8

- A. General:
 1. The exhaust fan shall run continuously 24 hours a day, 7 days a week.

3.05 SEQUENCE OF OPERATION - ENERGY RECOVERY VENTILATOR UNIT, ERV-1

- A. The ERV shall be configured to operate based on scheduled occupancy.
- B. ERV shall be incorporated into the BMS.

3.06 SEQUENCE OF OPERATION - HEATING AND COOLING UNIT VENTILATORS, UV-1 TO 32

- A. Modes of Operation:
 1. The BMS contractor shall supply one controller per unit that is tied into the BMS and is responsible for all programming, scheduling, and representation of the UV to the BMS. The UV's shall come without factory supplied controls.
 2. When the BAS is installed, the BAS shall be capable of sending the controller occupancy modes, heating/cooling modes, and space temperature set points. If a BAS is not present, or communication is lost with the BAS, the controller shall operate using default modes and set points.
- B. Occupied Mode:
 1. The supply fan shall run continuously and the outdoor air damper shall open to the minimum position during the occupied heating and cooling mode.
 - a. The existing building exhaust fans serving the associated rooms shall be engaged when the unit ventilators are in the "occupied" mode and the outside air dampers are open.
 - b. Warm-up Mode:
 - 1) During warm-up mode the outdoor air damper shall be closed and the heating hot water valve shall be fully open. The outdoor air damper shall remain closed

until the room temperature approaches within 3 deg. F of the desired heating set point (70 deg. F adjustable).

c. Heating Mode:

- 1) As the room temperature rises into the operating range of the set point, the outdoor air damper shall open to provide minimum ventilation. The unit ventilator shall modulate the heating hot water control valve to maintain the set point temperature.

d. Cooling Mode:

- 1) When the room temperature rises above the cooling set point (75 deg. F adjustable), the controller shall modulate the heat supply so that cool air flows into the room. The controller shall gradually shut off the heat and open the outside air damper to provide 100% outdoor air as necessary (free cooling). During this natural cooling stage the heating hot water control valve shall be fully closed.
- 2) Mechanical cooling shall be utilized if the cooling set point temperature cannot be maintained via the natural cooling mode. The unit ventilator shall cycle the condensing unit to maintain the set point temperature. During mechanical cooling the outdoor air damper shall return to the minimum outdoor air position.

C. Unoccupied Mode

1. The supply fan shall cycle as necessary to maintain the room temperature within set-point limits. The outdoor air damper shall be fully closed during the unoccupied mode.
 - a. The existing building exhaust fans serving the associated rooms and corridor shall be shut down when the unit ventilators are in the "un-occupied" mode.
 - b. Heating Mode:
 - 1) The heating hot water control valve shall be fully open during the unoccupied heating mode. The unit ventilator shall cycle the fan operation in order to maintain the unoccupied set point temperature (60 deg. F adjustable).
 - c. Cooling Mode:
 - 1) The condensing unit shall cycle on during the unoccupied cooling mode. The unit ventilator shall cycle the fan operation in order to maintain the unoccupied set point temperature (85 deg. F adjustable).

D. The BAS shall monitor the following data points from the communication interface:

1. Occupied Heating Temperature Set point
 - a. Unoccupied Heating Temperature Set point
 - b. Occupied Cooling Temperature Set point
 - c. Unoccupied Cooling Temperature Set point
 - d. Space Temperature
 - e. Filter Maintenance Status
 - f. Analog Output to valve
 - g. Freeze Thermostat

E. Freeze Condition:

1. In the event the Freeze-Stat (located in the return air stream) is activated (set at 40 deg. F adjustable), the following shall occur:
 - a. The outside air damper shall fully close.
 - 1) The heating hot water valve shall fully open.
 - 2) The supply air fan shall turn on.
 - 3) An alarm shall be generated at the BAS.

END OF SECTION

SECTION 232000 - PIPE, VALVES AND FITTINGS^{H2M}

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section describes the pipe, valves, fittings, and joining materials for use with the piping systems described in this Section and as shown on the Drawings.

1.02 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. Section 079201 - Non-Fire Rated Sleeves and Seals
- C. Section 230529 - Pipe Hangers and Supports
- D. Section 230555 - Mechanical System Identification
- E. Section 230700 - Pipe Insulation
- F. Section 232007 - Piping Specialties

1.03 ABBREVIATIONS

- A. The following are standard abbreviations:
 - 1. CWP: Cold working pressure.
 - 2. EPDM: Ethylene-propylene-diene-terpolymer rubber.
 - 3. NRS: Nonrising stem.
 - 4. OS&Y: Outside screw and yoke.
 - 5. PTFE: Polytetrafluoroethylene plastic.
 - 6. SWP: Steam working pressure.
 - 7. TFE: Tetrafluoroethylene plastic.
 - 8. NPS: Nominal Pipe Size

1.04 SUBMITTALS

- A. Product Data: For each type of valve indicated: Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
- B. Product data on pipe, fittings, gaskets, and bolts. Include dimensions, specifications, and manufacturer. Provide pipe and valve application schedule.
- C. Provide product data, including but not be limited to dimensions, specifications, manufacturer, installation and operation instructions, temperature and pressure ratings, end connections, and required clearances on piping specialties included in this Specification.
- D. Welder Certifications - Furnish the names of pipe welders and welding operators employed by the Contractor to perform the Work who have been qualified to use the welding procedures which have been qualified in accordance with the specified pressure piping codes or AWS or NFPA standards.
- E. Shop Drawings
 - 1. Where deviations from the Drawings and Specifications are proposed for any reason, submit shop drawings identifying proposed deviations showing layout of all piping, fittings,

materials, dimensions, and fabrication and installation details. Submit a comparison table of the specified features and ratings of the specified item and those of the proposed deviation to allow a direct comparison.

2. The review of deviations will be for pressure drop only. The review will not address clearances or accessibility. No dimensional or coordination check will be made.
3. The Contractor has the sole responsibility to review the Drawings, coordinate piping fabrication, and provide clearances and access for installation, maintenance and balancing of this Work, and Work of other trades. Unless specifically dimensioned, Drawings indicate approximate locations only. The Contractor has the sole responsibility to locate and route the piping.
4. Submit all layout shop drawings on not less than ¼ inch equals 1 foot scale drawings.

1.05 REFERENCES

- A. Division 01 - Quality Control: Requirements for references and standards.
- B. AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- C. ANSI C111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
- D. ASME B16.3 - Malleable Iron Threaded Fittings.
- E. ASME B16.5 - Steel Pipe Flanges and Flanged Fittings
- F. ASME B16.9 - Factory-Made Wrought Steel Buttwelding Fittings
- G. ASME B16.15 - Cast Bronze Threaded Fittings
- H. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- I. ASME B16.22 - Wrought Copper and Bronze Solder Joint Pressure Fittings.
- J. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
- K. ASME B16.24 - Cast Copper Alloy Pipe Flanges and Flanged Fittings.
- L. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
- M. ASME B16.39 - Pipe Unions, Malleable Iron Threaded
- N. ASME-B31.1 - Power Piping.
- O. ASME B31.2 - Fuel Gas Piping.
- P. ASME B31.5 - Refrigeration Piping.
- Q. ASME B31.9 - Building Service Piping.
- R. ASME B36.10M - Welded and Seamless Wrought Steel Pipe
- S. ASME SEC IV - Construction of Heating Boilers.
- T. ASME SEC IX - Welding and Brazing Qualifications.
- U. ASTM A47 - Ferritic Malleable Iron Castings

SECTION 232000 - PIPE, VALVES AND FITTINGS **H2M**

- V. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- W. ASTM A74 - Cast Iron Soil Pipe and Fittings.
- X. ASTM A105 - Forgings, Carbon Steel, for piping components.
- Y. ASTM A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
- Z. ASTM A181 - Forgings, Carbon Steel, for General Purpose Piping
- AA. ASTM A197 -Cupola Malleable Iron
- AB. ASTM A234/A234M - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- AC. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile
- AD. ASTM B32 - Solder Metal.
- AE. ASTM B42 - Seamless Copper Pipe.
- AF. ASTM B62 - Composition Bronze or Ounce Metal Castings
- AG. ASTM B75 - Seamless Copper Tube
- AH. ASTM B88 - Seamless Copper Water Tube.
- AI. ASTM B306 - Copper Drainage Tube (DWV).
- AJ. ASTM B584 - Copper Alloy Sand Castings for General Applications
- AK. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- AL. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
- AM. AWS A5.8 - Specification for Brazing Filler Material
- AN. AWWA C651 - Disinfecting Water Mains.
- AO. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
- AP. NFPA 30 - Flammable and Combustible Liquids Code
- AQ. NFPA 54 - National Fuel Gas Code.
- AR. NSF 61 - Domestic Water Pipe, Valves, and Fittings.
- AS. Mechanical Code of New York State-Latest Edition
- AT. Plumbing Code of New York State-Latest Edition
- AU. Fuel Gas Code of New York State-Latest Edition
- AV. FM - Factory Mutual Compliance

AW. UL - Underwriter's Laboratory Compliance

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set angle, gate, and globe valves closed to prevent rattling.
 - 4. Set ball and plug valves open to minimize exposure of functional surfaces.
 - 5. Set butterfly valves closed or slightly open.
 - 6. Block check valves in either closed or open position.
- 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 hand wheels or stems as lifting or rigging points.
- D. Protect all flange faces with wood, plastic or soft metal to prevent damage to parts.
- E. Protect all pipe threads from damage with plastic plugs or caps.
- F. Mark and identify all piping materials in accordance with the Reference Standards specified herein.

PART 2 - PRODUCTS**2.01 GENERAL**

- A. When two or more valves of the same type are used in the same service, furnish all valves of this type from the same manufacturer.
- B. Specific manufacturer's model numbers are cited in the following Piping Material Schedules to establish the desired quality and performance for each type valve or material. Equivalent products by other approved manufacturers are also acceptable. Approval shall be subject to review by the Architect.

2.02 LOW PRESSURE STEAM AND CONDENSATE (INCLUDING VENTS, RELIEF AND DRAIN LINES)

Item	Pipe Size	Description	Manufacturer/ Model No.
Piping	All sizes	Schedule 40, seamless steel, ASTM A 53 Grade B (all condensate and blowdown piping shall be schedule 80 seamless steel)	Wheatland
Joints	2 inches & smaller	Threaded Connections	
	2 ½ inches & larger	Welded Connections	
Fittings	2 inches & smaller	125#, cast iron, threaded, ASTM A126	Anvil
	2 ½ inches & larger	Standard Weight, Seamless steel, butt welded, ASTM A234	Weldbend

SECTION 232000 - PIPE, VALVES AND FITTINGS **H2M**

Item	Pipe Size	Description	Manufacturer/ Model No.
Flanges	2 ½ inches & larger	150#, forged steel, weld neck, bore to match pipe ID, ASTM A181	Weldbend
Bolts	All Sizes	Alloy Steel, Hex Head Bolts and Nuts, ASTM A307 Grade B	
Unions	2 inches & smaller	150#, malleable iron, brass trim, threaded ends ASTM A197, ASME B16.3	Anvil
Gaskets	All Sizes	Spiral wound metallic gaskets	Flexitallic Style LS/LSI
Gate Valves	2 inches & smaller	Class 125, threaded connections, rising stem, union bonnet, solid wedge, bronze body and wedge, non-asbestos packing and ductile iron hand wheel. MSS-SP80, ASTM B62	Nibco T-124
	2 ½ inches & larger	Class 125, flanged connections, OS & Y, cast-iron body and bonnet, bronze trim, solid-wedge disc, 200 psig CWP rating. ASTM A-126 Class B	Nibco F-617-O
Swing Check Valves	2 inches & smaller	Class 125, Y-pattern swing type, threaded connections, bronze body with TFE seat disc. MSS-SP80, ASTM B 62	Nibco T413-Y
	2 ½ inches & larger	Class 125, swing-type, flanged connections, cast iron body with bronze trim, non asbestos gasket. MSS-SP71, ASTM A-126 Class B	Nibco F918-B
Globe Valves	2 inches & smaller	Class 150, threaded connections, bronze body, bonnet, and seat, TFE disc, copper-silicone bronze stem, union-ring bonnet, 300 psig CWP rating. ASTM B-62	Nibco T-235-Y
	2 ½ inches & larger	Class 125, flanged connections, cast-iron body and bonnet with bronze trim, 200 psig CWP rating. ASTM A-126 Class B	Nibco F-718-B
Ball Valves	2 inches & smaller	Two-Piece, Full-Port, threaded connections, bronze body, type 316 stainless-steel vented ball and stem, reinforced TFE seats, 150 psig SWP and 600-psig CWP ratings. MSS SP-110, ASTM B 584 Alloy C84400, ASME B1.20.1	Nibco T-585-70-66
Butterfly Valves	2 ½ inches & larger	Single flange, full lug, 720 psig CWP and 50 psig SWP rating, permanently lubricated 300-series stainless-steel bushings with graphite and modified PTFE seats, graphite packing and gasket, one-piece duplex stainless-steel stem and stainless-steel disc. Valves NPS 6 and smaller shall have lever-lock operator; valves NPS 8 and larger shall have weatherproof gear operator. MSS SP-88, API 609, ANSI B 1634A, ANSI B16.5	Nibco LCS7822-3/5

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Unless otherwise shown, route piping in the most direct manner parallel to building lines in accordance with the Drawings. Group piping whenever practical at common elevations.
- B. Accurately align, support and connect piping without forcing.
- C. Locate piping so that access to and clearance around equipment, and minimum piping headroom of 6'-8" is maintained, except where otherwise shown.
- D. Space piping so that insulation and flanges, if any, have at least 1 inch clearance after maximum movement.
- E. Where pipe elevations are not shown, pitch supply and return lines to positive drain points and/or coils.
- F. Provide accessible flanges or union connections on the supply and return connections of terminal equipment and other items which must be disconnected for maintenance. Where unions are furnished as an integral part of the equipment, additional unions are not required unless required for access to or removal of components. Arrange equipment piping connections so that maintenance can be made without removing large sections of pipe or relocating the equipment.
- G. In Domestic Water Systems, connect branch lines to the top of the line. For all other liquid systems, connect branch lines to the bottom or lower half of the line, preferably the bottom.
- H. Connect branch lines in steam service and compressed air to the top or upper half of the line, preferably the top.
- I. Use fittings for all changes of direction. Bending of steel pipe is not permissible.
- J. Clean all piping materials before installation to remove grease, loose dirt, mill scale and other foreign matter.
- K. Provide air vents at all high points of water piping, and valved drains at all low points of water piping for complete venting, draining and flushing of the piping system. Locate and provide air vents at multiple high points that are necessary to prevent air binding in the piping system. Install additional air vents and drains if directed by the Architect, at no cost to the Owner. As a minimum provide drains and air vents
 1. In each section of piping separated by valves.
 2. On all coils.
 3. For each riser, where riser or runout to riser has a valve installed.
 4. In low point of piping to each down fed convector or radiator.
- L. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Provide loops, pipe offsets and anchors.
- M. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- N. Install gate or ball valves for shut-off and to isolate equipment, parts of systems, or vertical risers.

- O. Sleeve pipes passing through partitions, walls and floors.
- P. Identify piping under provisions of "Mechanical System Identification" Specification.
- Q. Provide escutcheons at all locations where piping installed exposed to view penetrates wall, partitions, floors and ceilings.
- R. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- S. Install flexible connectors at inlet and discharge connections of pumps and other vibration producing equipment.
- T. Install strainers on the supply side of each control valve, pressure regulating valve, solenoid valve, trap, and elsewhere as indicated.
- U. For pressurized liquid piping systems installed horizontally make reductions in pipe sizes using eccentric reducer fitting installed with the level side up to allow air venting.
- V. For all nipples up to and including six inches in length provide extra-heavy shoulder type. For all nipples over six inches in length provide corresponding material, quality and thickness as the pipe on which they are used. Do not use close nipples. Provide nipples with designation mark of the manufacturer conforming to the ASTM pipe specifications for system served.
- W. Make connections to all cooling and heating units with single or multiple cooling or heating coils in accordance with the manufacturer's instructions and labeling on equipment
- X. For pressures over 15 psig, use nipples and caps instead of plugs for permanent closures. Plugs in equipment provided by equipment manufacturers are acceptable.
- Y. Do not install piping above electrical panels. Route piping around panels.

3.02 STEAM AND CONDENSATE PIPING SYSTEMS

- A. Install drip legs with steam traps at low points and natural drainage points in the steam system, such as at the ends of mains, bottoms of risers, and ahead of pressure regulators, control valves, isolation valves, pipe bends, and expansion joints.
- B. On straight runs with no natural drainage points, install drip legs with steam traps at intervals not exceeding 150 feet where pipe is pitched down in the direction of the steam flow and a maximum of 100 feet where the pipe is pitched up so that condensate flow is opposite of steam flow.
- C. Size drip legs same diameter as the main up to 6 inches. In steam mains 6 inches and larger, provide drip legs half the size of the distribution line but never less than 6 inches. The length of the drip leg; 1-1/2 times the diameter of the distribution line but not less than 18 inches.
- D. Equip drip legs and dirt pockets with capped gate valves to allow removal of dirt and scale.
- E. In piping systems installed horizontally, make reductions in pipe sizes using eccentric reducer fitting installed with the level side down.
- F. Install steam supply piping at a uniform grade of 1/4 inch in ten feet downward in the direction of flow or toward the trap when a trap is present.

- G. Install condensate return piping at a uniform grade of 1/2 inch in ten feet downward in the direction of flow.
- H. Install automatic air vents at the end of all steam mains and headers, and on large equipment steam spaces to facilitate start-up and heat transfer. Locate the air vent at a high point of the piping system or equipment, or where the air collects. Pipe the outlet to a safe place, cut the pipe end at a 45 degree angle. Install an isolation valve upstream of automatic air vents.

3.03 NATURAL GAS PIPING SYSTEMS

- A. Provide capped dirt legs, full size of piping, for gas piping as close to the inlet of equipment as practical.
- B. Provide vent to outside at pressure regulators sized for pressure regulator failure.
- C. Above grade outdoor threaded piping and fittings shall be galvanized.
- D. Above grade outdoor welded piping and fittings shall be painted or provided with a coating and taping system in accordance with utility company requirements.
- E. Below grade piping shall be provided with corrosion protection (Magnesium anodes in accordance with local gas utility installation requirements).

3.04 FUEL OIL PIPING SYSTEMS

- A. Provide priming tees with caps at all locations on fuel oil suction lines where fuel oil pumps need manual priming.
- B. Use joint compounds and piping components resistant to the corrosive action of fuel oil.

3.05 COMPRESSED AIR PIPING SYSTEMS

- A. Where piping elevations are not shown, pitch all lines to positive drain points. Unless shown otherwise on the Drawings include a line size drip leg with 2 line size drain valves and a hose end connection at all drain points.
- B. Inspect, clean, cap and tag all piping at the end of each working day.
- C. If copper tubing connections are specified in the piping schedule, comply with the following:
 - 1. Braze all joints in the tubing, except those permitted to be approved brass flared-type gas tubing fittings and those valves or equipment requiring screw connections, with 15 percent silver alloy using Handy Flux made by Hand and Harmon Company. Continuously back-purge all brazed joints back-purged with dry nitrogen or carbon dioxide to prevent the formation of scale within the tubing. Use preformed silver solder insert rings. Do not leave any excess flux inside the completed joints.

3.06 PNEUMATIC CONTROLS PIPING

- A. Installation:
 - 1. Conceal all control systems air piping wherever possible. Copper air tubing in Mechanical Equipment, Steam Service, Machine and Boiler Rooms and Penthouse Mechanical Equipment Rooms may be installed exposed. Provide air piping a minimum of 1/4" O.D., with the exception that 1/8" O.D. seamless copper tubing will be permitted in branch runs to individual thermostats.

2. Provide hard temper copper tubing where exposed; concealed piping may be hard temper or soft annealed copper tubing. Run tubing parallel to the building lines. Bend tubing with bending tools. Use copper or brass solder type fittings, with the exception that all connections to apparatus or equipment must be made with compression or flare type fittings.
3. Support air tubing in an approved manner, with all overhead lines run parallel to each other, supported by clevis or trapeze hangers on maximum 5 foot centers, or by attachment to adjacent piping or electrical conduit.
4. Non-metallic air tubing may be used for temperature and humidity control systems, installed in accordance with the following:
 - a. Run exposed non-metallic tubing in Mechanical Equipment, Steam Service and Machine Rooms, Penthouse Mechanical Equipment Rooms, Finished Rooms or Finished Spaces in E.M.T. Install hard temper copper tubing for individual terminal runs, with the exception of terminal runs less than one foot in length, in which case flexible polyethylene tubing may be used.
 - b. Non-metallic multi-tube instrument tubing harness may be installed in concealed locations such as pipe chases, suspended ceilings or within wall construction. Single tube runs in the above locations shall be copper.
 - c. Non-metallic tubing may be installed inside control panels, within air conditioner and unit ventilator enclosures and other similar locations as approved. Number or color code, neatly tie and support tubing. Neatly and securely fasten flexible tubing connections, bridging control cabinet and its panel door, along hinge side of door and protect from abrasion.
5. Periodically test all tubing during the piping installation. Prior to connection to control instruments or apparatus, blow out all tubing runs to rid system of dust, dirt and moisture, and test entire piping system under 40 lbs. air pressure for 24 hours, during which time pressure shall not drop more than 10 lbs.

3.07 THREADED CONNECTIONS

- A. Ream pipe ends to remove burrs.
- B. Use only standard ANSI taper threads. Threads shall be full, sharp, clean, and free of fins and burrs.
- C. Apply joint sealing tape or paste to male threads only. Do not use paste on compressed air lines. When sealing fuel oil piping, use a thread-sealing compound suitable for oil when making up joints. When sealing natural gas piping, use a thread-sealing compound suitable for natural gas when making up joints.
- D. Do not use close or short nipples of a size where the length of unthreaded pipe is less than the width of a pipe wrench.
- E. Thredolets or similar code-approved fittings may be used for branch connections.
- F. Provide unions at all threaded valve locations to facilitate the removal of the valve.
- G. Joint Sealing Compound; Hercules, RectorSeal or approved equal.

3.08 WELDED CARBON STEEL CONNECTIONS

- A. Perform welding using qualified welders and procedures following specified reference standards.
- B. Do not use mitered welds for elbows.

- C. Welded branch connections may be used in place of welding tees provided that requirements of the applicable ASME Code for pressure piping, B31.1 and/or B31.9 are met.
- D. Weldolets or similar code-approved fittings may be used for branch connections.
- E. Qualifications of welders, welding procedures, performance of welders and welding operators are required complying with the requirements of ASME B31.9 and ASME Boiler and Pressure Vessel Code, Section IX. Keep records and certifications required by code on file and available for inspection.
- F. Whenever welding is done close to walls, floors or building structure, thoroughly clean the surfaces of weld splatter. Remove weld splatter from the surface of all welds, pipe and pipe supports.
- G. Provide long radius pattern for welding elbows unless otherwise shown on the Drawings.
- H. Examine and inspect welded pipe joints as follows:
 - 1. Visually examine all welded pipe joints for imperfections using qualified representatives. Submit qualifications to the Architect.
 - 2. Make available to the Architect records of visual examinations upon request.
 - 3. Remove weld defects by grinding or chipping and repair or replace joints in accordance with approved procedures.
 - 4. Make shop and field welded joints available to the Owner for nondestructive inspection and examination upon request.

3.09 FLANGED CONNECTIONS

- A. Arrange flange bolt holes to straddle the pipe vertical and horizontal centerlines, and match the orientation of mating flanges.
- B. Install piping to equipment without strain.
- C. Provide gaskets at all flanged connections suitable for the design and temperature of the fluid contained, and in accordance with Part 2 of this Section.
- D. Mate flat face flanges together and raised face flanges together.

3.10 COPPER TUBING CONNECTIONS

- A. Provide soldered or brazed in accordance with Part 2 of this Section.
- B. Make soldered and brazed connections in accordance with the procedures in the current edition of the Copper Tube Handbook of the Copper Development Association.
- C. Qualifications of brazers, brazing procedures, and performance of brazers and brazing operators are required in compliance with the requirements of ASME B31.1, ASME B31.9, and the Boiler and Pressure Vessel Code, Section IX. Keep records and certifications required by the code on file and available for inspection.
- D. Make solder joints on all copper water piping with 95/5 solder. Absolutely no lead-based solder will be accepted.
- E. Clean joints thoroughly before soldering.
- F. Remove excess solder and flux with a cloth or brush to leave a uniform clean fillet.

- G. For refrigeration copper tubing connections, comply with ASME B31.5. Make brazed joints on all refrigeration piping.

3.11 CONNECTIONS OF DISSIMILAR METALLIC MATERIALS

- A. Isolate connections between dissimilar metallic materials using dielectric connections. Use dielectric unions or flanges that provide a complete isolation of the two ends, including bolts for flanges, using materials suitable for the design pressure, temperature and fluid contained.

3.12 VALVES

- A. Provide valves of the same size as the pipe in which they are installed, unless shown otherwise on the Drawings. At pumps, match valve size to pipe size and not pump connection size.
- B. Install valves with the stem on or above the horizontal. Install valves with the stem horizontal if requirements of headroom, access or chain operation must be met.
- C. Pack valves and adjust glands before final acceptance.
- D. Install valve extension stems or chain operators where the center of valve hand wheels is more than 6 feet-6 inches above the floor and valve is 2 ½" and larger. Provide chain hooks where required to prevent fouling of chains on equipment and to clear walkways. Terminate chains approximately 3 feet-6 inches above the floor. Provide worm gear operators or impact hand wheels for all valves 6 inches and larger.
- E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation and a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation.
- F. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- G. Locate valves for easy access and provide separate support where necessary.
- H. Install check valves for proper direction of flow and as follows:
1. Swing Check Valves: In horizontal position with hinge pin level.
 2. Lift Check Valves: With stem upright and plumb
- I. Install butterfly valves with stems horizontal to allow support for the disc and the cleaning action of the disc.
- J. 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.
- K. Install balancing valves with lengths of straight pipe upstream and downstream of valve as per manufacturer's instructions such that calibrated accuracy is maintained. As a minimum provide straight lengths as per the following table;

REQUIRED STRAIGHT LENGTHS

Valve Size	Upstream (In Pipe Diameters)	Downstream (In Pipe Diameters)
½"-3"	3	1
4"-12"	5	2

- L. Chain wheel Actuators- Valve actuation assembly with sprocket rim, brackets, and chain.
 - 1. Sprocket rim with Chain guides: Ductile Iron (Aluminum for applications exposed to weather), of type and size required for valve.
 - 2. Brackets: Type, number, size, and fasteners required to securely mount actuator on valve.
 - 3. Chain: Stainless steel, of size required to fit sprocket rim.
 - 4. Manufacturers:
 - a. Babbitt Steam Specialty Co.
 - b. Roto Hammer Industries

3.13 CONTROL VALVE INSTALLATION

- A. Install all control valves so that the stem position is not more than 60 degrees from the vertical up position.
- B. Install valves in accordance with the manufacturer's recommendations.
- C. Install control valves so that they are accessible and serviceable, and such that actuators may be serviced and removed without interference from structure or other pipes, ducts and/or equipment.
- D. Install isolation valves at control valves such that control valve body may be serviced without draining the supply/return side piping system. Install unions at all connections to screwed type control valves.

3.14 PRESSURE TESTING, FLUSHING AND CLEANING

- A. Pressure test piping systems in accordance with applicable codes and as described herein.
- B. Pressure testing - Schedule pressure testing so that it may be witnessed by the Architect, Owner, or their representative. Perform tests in accordance with the following procedures:
 - 1. Before testing, complete the installation of each pipe line, including final supports, hangers and anchors. Perform testing before insulation or paint is applied for examination during the test. Clean piping and equipment of metal cuttings and foreign matter as they are installed.
 - 2. Codes - Pressure test piping to assure integrity of material and workmanship in accordance with the applicable ASME Code for pressure piping (B31) and New York State Code.
 - 3. Protection of Equipment - Protect equipment, instruments and piping specialties which are not included in the test by either disconnecting from the piping and blanking off the end of the pipe with a blind flange, plug or cap, or isolating by insertion of a line blind or spool piece as required. Disconnect pneumatic control lines and close all openings.
 - 4. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - 5. Piping may be tested in sections or circuits as required for the progress of the work.
 - 6. Provide all systems to be pressurized with the appropriate gauges, certified calibrated by the manufacturer, and pressure-relieving devices.
 - 7. Install relief valve set at a pressure no more than 1/3 higher than the test pressure, to protect against damage by expansion of liquid or other source of overpressure during the test. Do not allow test pressure to exceed maximum pressure for any vessel, pump, valve, or other component in system under test.
 - 8. Records - Provide records of all tests showing line designation, test pressure, ambient temperature, date of test, retests and signature of witness.
- C. Pneumatic Test Procedures - Perform pneumatic testing in accordance with ASME B31.9

1. Prior to application of full pneumatic test pressure, perform a preliminary test at 10 psig for a minimum of ten (10) minutes to reveal any major leaks.
 2. After the preliminary test, apply pressure gradually in stages until test pressure is reached.
 3. Test durations:
 - a. For all systems the minimum test duration is that required to thoroughly examine the system for leaks.
 - b. Natural gas piping; Maintain test pressure for a minimum of one hour but not less than ½ hour for each 500 cubic feet of pipe volume. After test, purge the entire system of test gas.
 - c. For all other systems maintain test pressure for a minimum of ten (10) minutes without fluctuation.
 4. Check all joints, valves, etc. for leaks with a thick soap-water solution.
 5. Repair leaks as specified under "Repair of Line Leaks".
 6. Repeat pneumatic test until there are no leaks.
 7. Ensure that adequate protection is provided to prevent injury to persons or property during leak testing.
 8. Test systems to the pressure indicated under "Pressure Testing Schedule"
- D. Hydrostatic Test Procedures - Perform hydrostatic testing in accordance with ASME B31.9.
1. Perform test using the pressure indicated under "Pressure Testing Schedule"
 2. After hydrostatic test pressure has been applied for at least two hours, examine piping, joints, and connections for leakage while maintaining test pressure. Repeat hydrostatic test until there are no leaks.
 3. Repair leaks as specified under "Repair of Line Leaks"
- E. Service Testing - Perform service testing in accordance with ASME B31.9.
1. For gases and steam and condensate service not over 15 psig, and for nontoxic, noncombustible, nonflammable liquids at pressures not over 100 psig and temperatures not over 200 degrees F a system test with the service fluid is acceptable. This exemption does not apply to natural gas piping.
 2. Bring the piping system up to operating pressure gradually with visual examination at a pressure between one-half and two-thirds of design pressure. Make a final examination at operating pressure.
 3. Repair leaks as specified under "Repair of Line Leaks"
 4. Repeat service test until there are no leaks.
- F. Repair of Line Leaks - Comply with the following procedures for repair of leaks. In each case retest after repairs are made.
1. Soldered/Brazed Joints - Remove solder/brazing alloy and reapply with proper flux.
 2. Flanged Joints - Check to determine flange end alignment and that all bolts are uniformly tightened with the required torque. If leak persists, depressurize the line, remove gasket, examine flange end face, and insert new gasket.
 3. Threaded Joints - Tighten joint to a required torque. If leak does not stop, replace pipe and/or fittings. Do not use pipe dope, cement or seal weld to stop pipe leaks.
 4. Gasketed Joints - Remove existing gasket and insert new gasket.
 5. Welded Steel Joints - Repair pipe in accordance with applicable ASME B31 code.
 6. Leaks in Material - Leaks located in pipe or fitting material require the replacement of that section of pipe or fitting and a repeat of the entire system using the complete procedure required for that system. Caulking, welding or epoxy is not permitted. Repair all damage caused by leaks.
- G. Flushing - Complete pressure testing requirements prior to flushing. Performance of the flushing may be witnessed by the Architect, Owner, or their representative, provide ample notification to all parties in advance of flushing any system. Perform system flushing in accordance with the following procedures:

SECTION 232000 - PIPE, VALVES AND FITTINGS^{H2M}

1. Flush all main and branch steam and liquid piping systems after pressure testing is complete with new potable water while draining the system at all low points. Isolate all connected equipment and flush individually.
 2. Flushing for piping and equipment will be considered complete when water samples taken at all low points indicate clear discharge-with no visible solids. If not clear, continue flushing and sampling until discharge is clear.
- H. Cleaning - Complete flushing requirements prior to cleaning. Performance of the cleaning may be witnessed by the Architect, Owner, or their representative, provide ample notification to all parties in advance of cleaning any system. Perform system cleaning in accordance with the following procedures:
1. Clean all steam and condensate lines by blowing them out with live steam. Discharge steam and condensate from each main and branch safely to atmosphere for a minimum of five minutes.
 2. Clean all compressed air, instrument air, and fuel oil lines with oil-free dry compressed air at design pressure through each section so that they are blown free of dirt and debris.
 3. Clean domestic water lines by flushing with water until effluent is visibly as clean as the flushing medium.
 4. Clean hot water/chilled water lines as described below:
 - a. When flushing discharge is clear, fill piping systems with water and sufficient approved alkaline cleaning material to remove dirt, oil and grease. Include all connected equipment in the cleaning.
 - b. Vent system and place in operation, with automatic controls operating at set point temperature or an operating temperature designated by the Architect. Circulate the solution through the system for a minimum of 4 consecutive hours.
 - c. After 4 hours, drain system and flush with clean water until the pH at the farthest drain matches the clean water input. Keep strainers unplugged during the cleaning operations. Refill system with clean water.
 5. Clean temporary pump strainers and strainers at coils, etc. every 2 hours periodically during cleaning procedures. Do not remove temporary strainers until all cleaning steps are completed and the operation of the system indicates that the system is free of all foreign matter.
 6. Blow out all piping and equipment after cleaning and final flushing is completed and the system is drained with clean dry instrument air for a minimum of 15 minutes or until all water is expelled from the system. Upon completion seal the system by closing all drains and vents.
 7. Following the Architect approval of the above flushing and cleaning procedures, immediately fill each system and chemically treat and monitor in accordance with the "Chemical Treatment Systems" specifications.
- I. Pressure Testing Schedule:

Service	Test Type	Design Operating Pressure (psig)	Test Pressure (psig)
Steam Piping	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi
Condensate Piping	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi

3.15 PAINTING

- A. Upon completion of the installation, remove all protecting materials, thoroughly remove all scale and grease and leave in a clean condition for painting. Paint in accordance with the requirements of the "Painting" Specification Section.

3.16 PIPE FREEZING

- A. Where pipe freezing is required because of the lack of isolation valves, completely freeze piping using a jacket of liquid nitrogen. Provide the services of a company specializing in pipe freezing to perform the Work. Submit to the Architect evidence that the company has performed this work for at least 5 years.
- B. Approved Manufacturer's:
 - 1. Freeze Tech, Inc.
 - 2. Pro Tapping, Inc.

3.17 HOT TAPPING

- A. Provide a hot tapping tool for cutting holes in piping under pressure without interrupting system operation and without release or loss of fluid.
- B. Provide hot taps to permit new tie-ins to existing piping systems, insertion of flow meters, and permanent or temporary bypasses.
- C. Hot tap rating, ½ through 48 inch line size: 1500 psig maximum operating pressure at 100 degrees F and 750 degrees F maximum operating temperature at 700 psig.
- D. Provide the following information on the line to be tapped to the hot tap vendor before starting the Work:
 - 1. Line size, wall thickness, and pipe material.
 - 2. Fluid in line, and operating pressure and temperature.
 - 3. Dimensional information and restrictions, if any.
 - 4. Tap size and orientation (if other than 90 degrees perpendicular to run of the pipe, give full details).
- E. Provide the services of a company specializing in hot taps to perform the Work. Submit to the Architect evidence that the company has performed this work for at least 5 years.
- F. Approved Manufacturer's:
 - 1. Topaz, Inc.
 - 2. Pro Tapping, Inc.

END OF SECTION

SECTION 232001 - CONDENSATE DRAIN PIPING **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
- B. Condensate Drain.

1.02 RELATED SECTIONS

- A. Section 230529 - Pipe Hangers and Supports
- B. Section 230555 - Mechanical System Identification
- C. Section 230700 - Piping Insulation.

1.03 REFERENCES

- A. Section 014500 - Quality Control: Requirements for references and standards.
- B. ASTM D1784 - Rigid Vinyl Compounds.
- C. ASTM D1785 - PVC Plastic Pipe, Schedule 40
- D. ASTM D2466 - PVC Plastic Fittings, Schedule 40
- E. ASTM D2665 - PVC Drain, Waste, and Vent Pipe and Fittings
- F. ASTM D2564 - Solvent Cements for PVC Pipe and Fittings
- G. ASTM D2321 - Underground Installation of Thermoplastic Pipe (non-pressure applications)
- H. ASTM F1668 - Procedures for Buried Plastic Pipe
- I. ASTM F1866 - Fabricated PVC DWV Fittings
- J. NSF Standard 14 - Plastic Piping Components and Related Materials.
- K. NSF Standard 61 - Drinking Water System Components - Health Effects.

1.04 SUBMITTALS FOR REVIEW

- A. Section 013300 - Submittals: Procedures for submittals.
- B. Product Data: Provide data on pipe materials, pipe fittings, and accessories. Provide manufacturers catalog information.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with State of New York and Town code.
- B. Identify pipe with marking including size, ASTM material classification and ASTM specification.

1.06 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with the State of New York and the Town code.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Section 016500 – Product Delivery, Storage, and Handling: Transport, handle, store, and protect products.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Section 014536 – Environmental Quality Control: Moisture control affecting products on site.

PART 2 - PRODUCTS

2.01 CONDENSATE DRAIN PIPING (DIAMETER LESS THAN OR EQUAL TO 1")

- A. Copper Type L Pipe and Fitting System.
- B. Pipe and fittings shall be manufactured from Type L Copper.
- C. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.
- D. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 61 or the health effects portion of NSF Standard 14.
- E. Testing with or transport/storage of compressed air or gas in Copper pipe or fittings shall not be permitted.
- F. The system is intended for pressure drainage applications where the temperature will not exceed 140°F.

2.02 CONDENSATE DRAIN PIPING (DIAMETER GREATER THAN 1")

- A. Type L copper solid wall pipe and type L copper fitting system.
- B. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.
- C. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 14.
- D. Testing with or transport/storage of compressed air or gas in copper pipe or fittings shall not be permitted.
- E. The system is intended for non-pressure drainage applications where the temperature will not exceed 140°F.

2.03 PVC SCHEDULE 40 SOLID WALL PIPE AND PVC DWV FITTING SYSTEM.

- A. Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454 per ASTM D 1784.
- B. PVC Schedule 40 pipe shall be iron pipe size (IPS) conforming to ASTM D1785 and ASTM D2665.

SECTION 232001 - CONDENSATE DRAIN PIPING **H2M**

- C. Injection molded PVC DWV fittings shall conform to ASTM D2665. Fabricated PVC DWV fittings shall conform to ASTM F1866.
- D. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer.
- E. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 14.
- F. Testing with or transport/storage of compressed air or gas in PVC pipe or fittings shall not be permitted.
- G. Buried pipe shall be installed in accordance with ASTM D2321 and ASTM F1668.
- H. Solvent cement joints shall be made in a two step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D2564.
- I. Primer shall conform to ASTM F656.
- J. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds.
- K. The system is intended for non-pressure drainage applications where the temperature will not exceed 140°F.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Section 013100 - Project Management and Coordination: Verification of existing conditions before starting work.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and the requirements of the Plumbing Code of New York State.
- B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls. Effect changes in size with reducing fittings.
- C. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to fittings. Refer to Section 230700.
- F. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 083100 - Access Doors and Panels.

SECTION 232001 - CONDENSATE DRAIN PIPING **H2M**

- G. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- H. Sleeve pipes passing through partitions, walls and floors.
- I. Identify piping under provisions of Section 230555.

3.04 APPLICATION

- A. Install unions downstream at equipment or apparatus connections.

3.05 ERECTION TOLERANCES

- A. Section 014500 - Quality Control: Tolerances.
- B. Establish invert elevations, slopes for drainage to ¼ inch per foot minimum. Maintain gradients.

3.06 FIELD QUALITY CONTROL

- A. Drainage System: Test plug all system openings with the exception of the system's highest point. Fill system with water to the point of overflow and subject the highest point to 10-foot head of water. The system shall be considered tight if the pressure is held for not less than 30 minutes without signs of leakage.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section describes steam specialties, including trap diffusers, thermostatic air vents, vacuum breakers, pressure reducing valves, moisture separators, and steam leak detection systems for steam and condensate piping systems.

1.02 REFERENCES

- A. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels.
- B. ASME B31.1 - Power piping.
- C. ASME B31.9 - Building Services piping.

1.03 SUBMITTALS

- A. Product Data: Provide product data for manufactured products and assemblies required for the Work. Include component sizes, rough-in requirements, service sizes and finishes. Include product description, model and dimensions.
- B. Submit manufacturer's instructions for maintenance and repair.
- C. Provide a valve and specialty application schedule.

1.04 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include installation instructions, assembly views, lubrication instructions and replacement parts list.

1.05 RELATED WORK

- A. Section 232000 - Pipe, Valves and Fittings

1.06 QUALIFICATIONS

- A. Companies specializing in manufacturing products specified with at least 5 years of experience and products that have been on the market for at least 3 years.

PART 2 - PRODUCTS

2.01 THERMOSTATIC AIR VENTS

- A. Brass body, seat gasket and cap with stainless steel bellows, seat and spring, threaded connections suitable for 125 psig maximum operating pressure.
- B. Approved manufacturers: - Spirax/Sarco Model T202

2.02 VACUUM BREAKERS

- A. Steam Systems (Atmospheric Return)
 - 1. Provide Vacuum Breakers on all modulating or on/off heat exchangers and coils, except in vacuum return systems. Installed in the supply side between the control valve and equipment and be of hardened ball check valve design with all working parts manufactured

- from stainless steel. Construction; Brass or stainless steel bodies as required for the application, suitable for operating conditions of 210 psig (or 304 psig) saturated steam.
- 2. Approved manufacturers: - Spirax/Sarco Model VB.
- 3. Install in a vertical position with cap at the top at the highest point of the circuit. Provide an isolating valve upstream of device.

B. Steam Systems (Vacuum Return)

- 1. Provide swing check valves of the type specified for the piping system between the coil and the vacuum return line. Provide isolation valves and union upstream and downstream of the device.

2.03 TRAP DIFFUSERS

- A. Construction: Stainless steel construction with a knitted and compacted wire mesh diffusing element.
- B. For venting applications provide on the outlet side of a steam trap or liquid drainer a suitable fitting to ensure that the discharge of condensate is towards the ground or another safe enclosure.
- C. Approved manufacturers: Spirax/Sarco

2.04 LIQUID EXPANSION STEAM TRAPS

- A. Solidly liquid-filled thermostatic element, and field-adjustable to discharge condensate at a fixed temperature below 212°F.
- B. When used for freeze protection install with outlet downwards so trap is self draining.
- C. Approved manufacturers: -Spirax/Sarco - Thermoton

2.05 STEAM TRAP LEAK DETECTION SYSTEM

- A. Steam trap leak detection system comprised of an in-line sensor chamber or trap with Integral Sensor and a portable indicator box and cable for test purposes. Install sensor chambers on each trap with a ductile iron or steel body with screwed or socket weld connections incorporating a level-sensing electrode.
- B. Provide one hand-held indicator box with positive colored pass and fail lights, an internal circuit check facility, UL listed as intrinsically safe for use in hazardous locations. Provide an indicator cable 4 feet in length with each box.
- C. System operation: - Test for steam loss by detecting the presence or absence of condensate using the difference in conductivities of water and steam indicating trap operation by a green (pass) light or a red (fail) light on the indicator box.
- D. Approved Manufacturers: Spirax/Sarco - Spira-Tec Leak Detection System

2.06 PILOT OPERATED PRESSURE REDUCING VALVES

- A. Provide steam pressure-reducing valves in sizes and quantities as shown on the Drawings.
- B. Operation and adjustment: - Pilot-operated, spring type, single seat, designed for dead-end service and guaranteed to control delivery pressure within plus or minus 1 psi. Manually adjustable within the range shown on the Drawings.

- C. Construction: - Cast steel body with 150 or 300 psi ANSI flanges as indicated on the Drawings. Provide valves with stainless steel seat rings, trim and stem.
- D. Approved Model: Spirax/Sarco Series 25

2.07 MOISTURE SEPARATORS

- A. High efficiency internal baffle type having a pressure drop that does not exceed an equivalent length of pipe. Iron body with screwed or flanged connections. Provide a screwed bottom drain for the installation of a trap to discharge any accumulated liquid.
- B. Approved Manufacturers: Spirax/Sarco S Series.

2.08 SAFETY AND RELIEF VALVES

- A. General Requirements: Valves shall be as specified by ASME Code governing manufacture of such valves within scope of their particular usage, i.e., Heating Boilers, Power Boilers, Unfired Pressure Vessels, etc., shall be tested, rated and listed by National Board of Boiler and Pressure Vessel Inspections and shall bear symbol of ASME and NBB and PVI, unless otherwise specified. Liquid relief valves do not require ASME tagging or marking, or NBB and PVI Certification. Valves for applications specified shall conform to the ASME Code, Section IV, Heating Boilers and the following:
 - 1. Valves for Steam Heating Boilers: (Operating at 16 psig and above) shall be sized in accordance with ASME Boiler Code and the State of New York Department of Labor Code, shall be ASME Standard, ASME tested, and NBB & PVI certified and marked in accordance with ASME requirements. Valve body and yoke shall be cast steel ASTM A 216 Grade WCB and stem, disc, seat bushing or nozzle, adjusting ring, compression screw and other trim parts shall be stainless steel or equivalent material as approved by State. Valves shall have flanged inlet and outlet connections, with inlet connection being 300 lb. class.
 - 2. Valves for steam heating boilers operating at a maximum pressure of 15 psig shall have a maximum pressure setting of 15 psig. Sizing of valves shall be in accordance with ASME Table HG 400.1. Valve bodies shall be bronze or cast iron, with discs and seats of bronze.
 - 3. Valves for Unfired Pressure Vessels: Safety and safety relief valves on secondary side of unfired pressure tanks, water heaters and heat exchangers shall comply with Code requirements governing applicable equipment as outlined in ASME Code, Section IV, Article 4, Paragraph HG 400.3 and as follows: Secondary side of heat exchanger shall be protected by officially rated valves, set for same pressure or temperature as heretofore specified, when secondary side furnishes steam or hot water for purpose equivalent to purposes for which a boiler would be installed; valves for this purpose shall be sized in accordance with Unfired Vessel Code.
 - 4. Relief Valves For Use On The Discharge Side of Steam Pressure Reducing Valve Stations:
 - a. When pressure reducing valve station is set to deliver steam at a pressure not to exceed 10 psig, safety relief valves shall comply with the requirements of the ASME Low Pressure Boiler Code, Section 4, Article 4 and shall be sized to relieve all steam that reducing valve or by-pass valve can deliver when in a wide-open position, without permitting pressure to rise above 20 psig.
 - b. When pressure reducing valve station is set to deliver steam at a pressure in excess of 10 psig, safety relief valves shall be manufactured in accordance with the ASME Power Code, Section 1, but may be sized in accordance with the Unfired Pressure Vessel Code. Valves shall relieve all steam the pressure reducing valve or by-pass valve can deliver, without permitting pressure to rise more than 10 percent above the maximum allowable working pressure.

- B. End Connections: Unless otherwise specified, safety valves, relief valves and safety relief valves, in sizes 3/4 inch to 3 inches IPS inclusive, may be furnished with male or female pipe thread inlet and female pipe thread outlet; valves over 3 inches IPS must be furnished with 125 lb. or 250 lb. flanged inlet and may be equipped with female threaded or 125 lb. flanged outlet.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

- A. Install Work in accordance with manufacturer's instructions and as shown on the Drawings.

3.02 PRESSURE REDUCING VALVE INSTALLATION

- A. Install pressure-reducing valve stations complete with strainer, moisture separator, stream trap, pressure gauges, and shutoff valves.
- B. Install moisture separator in a horizontal position with the drain directly below the line. Install a float and thermostatic trap with strainer and isolation valves in the drain line.
- C. Provide a shutoff valve on both sides of the pressure-reducing valve station.
- D. Provide Type 304 stainless steel pressure-sensing line for pilot operated valves.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Requirements of the following Division 23 Sections apply to this section:
 - 1. Section 230010 - General Mechanical Requirements.
 - 2. Section 230529 - Pipe Hangers And Supports
 - 3. Section 230555 - Mechanical System Identification
 - 4. Section 230700 - Pipe Insulation

1.02 SUMMARY

- A. This Section includes refrigerant piping used for air conditioning applications. This Section includes:
 - 1. Piping, tubing, fittings, and specialties.
 - 2. Special duty valves.
 - 3. Refrigerants.
- B. Products installed but not furnished under this Section include pre-charged tubing, refrigerant specialties, and refrigerant accessories furnished as an integral part of or separately with packaged air conditioning equipment.

1.03 SUBMITTALS

- A. Product data for the following products:
 - 1. Each type of valve specified.
 - 2. Each type of refrigerant piping specialty specified.
- B. Shop Drawings showing layout of refrigerant piping, specialties, and fittings including, but not necessarily limited to, pipe and tube sizes, valve arrangements and locations, slopes of horizontal runs, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and proximity to equipment.
- C. Brazer's Certificates signed by Contractor certifying that brazers comply with requirements specified under "Quality Assurance" below.
- D. Maintenance data for refrigerant valves and piping specialties, for inclusion in Operating and Maintenance Manual specified in Division 01 and Division 23.

1.04 QUALITY ASSURANCE

- A. Qualify brazing processes and brazing operators in accordance with ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications".
- B. Regulatory Requirements: Comply with provisions of the following codes:
 - 1. ANSI B31.5: ASME Code for Pressure Piping - Refrigerant Piping.
 - 2. ANSI/ASHRAE Standard 15: Safety Code for Mechanical Refrigeration.
- C. Mechanical Code of New York State

1.05 SEQUENCING AND SCHEDULING

- A. Coordinate the installation of roof piping supports, and roof penetrations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:
- B. Refrigerant Valves and Specialties:
 - 1. Alco Controls Div, Emerson Electric
 - 2. Danfoss Electronics, Inc
 - 3. EATON Corporation, Control Div
 - 4. Henry Valve Company
 - 5. Parker-Hannifin Corporation, Refrigeration and Air Conditioning Division
 - 6. Sporlan Valve Company

2.02 PIPE AND TUBING MATERIALS

- A. General: Refer to Part 3, Article "PIPE APPLICATIONS" for identification of systems where the below specified pipe and fitting materials are used.
- B. Copper Tubing: ASTM B 280, Type ACR, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing. Tubing shall be factory cleaned, ready for installation, and have ends capped to protect cleanliness of pipe interiors prior to shipping.
- C. Copper Tubing: ASTM B 88, Type L, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing.

2.03 FITTINGS

- A. Wrought-Copper Fittings: ANSI B16.22, streamlined pattern for hard drawn and soft copper.

2.04 JOINING MATERIALS

- A. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (Silver)

2.05 VALVES

- A. General: Complete valve assembly shall be UL-listed and designed to conform to ARI 760.
- B. Globe: 450 psig maximum operating pressure, 275 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass wing cap and bolted bonnet; replaceable resilient seat disc; plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight through or angle pattern, with solder-end connections.
- C. Check Valves - Smaller Than 7/8 inch: 500 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast brass body, with removable piston, Teflon seat, and stainless steel spring; straight through globe design. Valve shall be straight through pattern, with solder-end connections.
- D. Check Valves - 7/8 inch and Larger: 450 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass bolted bonnet; floating piston with mechanically retained Teflon seat disc. Valve shall be straight through or angle pattern, with solder-end connections.

- E. Solenoid Valves: 250 deg. F temperature rating, 400 psig working pressure; forged brass, with Teflon valve seat, two-way straight through pattern, and solder end connections. Provide manual operator to open valve. Furnish complete with NEMA 1 solenoid enclosure with 1/2 inch conduit adapter, and 24 volt, 60 Hz. normally closed holding coil.
- F. Hot Gas Bypass Valve: adjustable type, sized to provide capacity reduction beyond the last step of compressor unloading; and wrought copper fittings for solder end connections.

2.06 REFRIGERANT PIPING SPECIALTIES

- A. General: Complete refrigerant piping specialty assembly shall be UL-listed and designed to conform to ARI 760.
- B. Strainers: 500 psig maximum working pressure; forged brass body with monel 80-mesh screen, and screwed cleanout plug; Y-pattern, with solder end connections.
- C. Moisture/liquid Indicators: 500 psig maximum operation pressure, 200 deg. F maximum operating temperature; forged brass body, with replaceable polished optical viewing window, and solder end connections.
- D. Filter-driers: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter-drier core kit, including gaskets. Standard capacity desiccant sieves to provide micronic filtration.
- E. Flanged Unions: 400 psig maximum working pressure, 330 deg. F maximum operating temperature; two brass tailpiece adapters for solder end connections to copper tubing; flanges for 7/8 inch through 1-5/8 inch unions shall be forged steel, and for 2-1/8 inch through 3-1/8 inch shall be ductile iron; four plated steel bolts, with silicon bronze nuts and fiber gasket. Flanges and bolts shall have factory-applied rust-resistant coating.
- F. Flexible Connectors: 500 psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections, and synthetic covering; dehydrated, pressure tested, minimum 7 inch in length.

2.07 REFRIGERANT

- A. Refrigerant No. 410A, in accordance with ASHRAE Standard 34.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine rough-in for refrigerant piping systems to verify actual locations of piping connections prior to installation.

3.02 PIPE APPLICATIONS

- A. Use Type L, or Type ACR drawn copper tubing with wrought copper fittings and brazed joints above ground, within building. Use Type K, annealed temper copper tubing for 2 inch and smaller without joints, below ground and within slabs. Mechanical fittings (crimp or flair) are not permitted.
- B. Install annealed temper tubing in pipe duct. Vent pipe duct to the outside.

- C. If other than Type ACR tubing is used, clean and protect inside of tubing as specified in Article "CLEANING" below.

3.03 PIPING INSTALLATIONS

- A. General: Install refrigerant piping in accordance with ASHRAE Standard 15 - "The Safety Code for Mechanical Refrigeration."
- B. Install piping in as short and direct arrangement as possible to minimize pressure drop.
- C. Install piping for minimum number of joints using as few elbows and other fitting as possible.
- D. Arrange piping to allow normal inspection and servicing of compressor and other equipment. Install valves and specialties in accessible locations to allow for servicing and inspection.
- E. Provide adequate clearance between pipe and adjacent walls and hanger, or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full thickness insulation.
- F. Insulate suction lines. Liquid line are not required to be insulated, except where they are installed adjacent and clamped to suction lines, where both liquid and suction lines shall be insulated as a unit.
- G. Do not install insulation until system testing has been completed and all leaks have been eliminated.
- H. Install branch tie-in lines to parallel compressors equal length, and pipe identically and symmetrically.
- I. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.
- J. Slope refrigerant piping as follows:
 - 1. Install horizontal hot gas discharge piping with 1/2" per 10 feet downward slope away from the compressor.
 - 2. Install horizontal suction lines with 1/2 inch per 10 feet downward slope to the compressor, with no long traps or dead ends which may cause oil to separate from the suction gas and return to the compressor in damaging slugs.
 - 3. Liquid lines may be installed level.
- K. Install traps and double risers where indicated, and where required to entrain oil in vertical runs.
- L. Use fittings for all changes in direction and all branch connections.
- M. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.
- N. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- O. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- P. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1 inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

- Q. Locate groups of pipe parallel to each other, spaced to permit applying insulation and servicing of valves.
- R. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.
- S. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, and floors, maintain the fire rated integrity. Refer to Division 7 for special sealers and materials.
- T. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.
- U. Install strainers immediately ahead of each expansion valve, solenoid valve, hot gas bypass valve, compressor suction valve, and as required to protect refrigerant piping system components.
- V. Install moisture/liquid indicators in liquid lines between filter/driers and thermostatic expansion valves and in liquid line to receiver.
- W. Install moisture/liquid indicators in lines larger than 2-1/8 inch OD, using a bypass line.
- X. Install unions to allow removal of solenoid valves, pressure regulating valves, expansion valves, and at connections to compressors and evaporators.
- Y. Install flexible connectors at the inlet and discharge connection of compressors.

3.04 HANGERS AND SUPPORTS

- A. General: Hanger, supports, and anchors are specified in Division 23 Section "PIPE HANGERS AND SUPPORTS." Conform to the table below for maximum spacing of supports:
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet in length.
- C. Support horizontal copper tubing in accordance with MSS SP-69 Tables 3 and 4, excerpts of which follow below:

NOMINAL PIPE SIZE (Inches)	ROD DIAMETER (Inches)	MAXIMUM SPACING (Feet)
1/2 to 3/4	3/8	5
1	3/8	6
1-1/4	3/8	6
1-1/2	3/8	8
2	3/8	8

- D. Support vertical runs at each floor.

3.05 PIPE JOINT CONSTRUCTION

- A. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."
- B. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.

- C. CAUTION: When solenoid valves are being installed, remove the coil to prevent damage. When sight glasses are being installed, remove the glass. Remove stems, seats, and packing of valves, and accessible internal parts of refrigerant specialties before brazing. Do not apply heat near the bulb of the expansion valve.
- D. Fill the pipe and fittings during brazing, with an inert gas (i.e., nitrogen or carbon dioxide) to prevent formation of scale.
- E. Heat joints using oxy-acetylene torch. Heat to proper and uniform brazing temperature.

3.06 VALVE INSTALLATIONS

- A. General: Install refrigerant valves where indicated, and in accordance with manufacturer's instructions.
- B. Install globe valves on each side of strainers and driers, in liquid and suction lines at evaporators, and elsewhere as indicated.
- C. Install a full sized, 3-valve bypass around each drier.
- D. Install solenoid valves ahead of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at the top.
- E. Electrical wiring for solenoid valves is specified in Division 26. Coordinate electrical requirements and connections.
- F. Thermostatic expansion valves may be mounted in any position, as close as possible to the evaporator.
- G. Where refrigerant distributors are used, mount the distributor directly on the expansion valve outlet.
- H. Install the valve in such a location so that the diaphragm case is warmer than the bulb.
- I. Secure the bulb to a clean, straight, horizontal section of the suction line using two bulb straps. Do not mount bulb in a trap or at the bottom of the line.
- J. Where external equalizer lines are required make the connection where it will clearly reflect the pressure existing in the suction line at the bulb location.
- K. Install pressure regulating and relieving valves as required by ASHRAE Standard 15.

3.07 EQUIPMENT CONNECTIONS

- A. The Drawings indicate the general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow servicing and maintenance.

3.08 FIELD QUALITY CONTROL

- A. Inspect, test, and perform corrective action of refrigerant piping in accordance with ASME Code B31.5, Chapter VI.
- B. Repair leaking joints using new materials, and retest for leaks.

3.09 CLEANING

- A. Before installation of copper tubing other than Type ACR tubing, clean the tubing and fitting using following cleaning procedure:
 - 1. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through the tubing by means of a wire or an electrician's tape.
 - 2. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
 - 3. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
 - 4. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

3.10 ADJUSTING AND CLEANING

- A. Verify actual evaporator applications and operating conditions, and adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.
- B. Clean and inspect refrigerant piping systems in accordance with requirements of Division-23 General Mechanical Requirements
- C. Adjust controls and safeties. Replace damaged or malfunctioning controls and equipment with new materials and products.

3.11 COMMISSIONING

- A. Charge system using the following procedure:
 - 1. Install core in filter dryer after leak test but before evacuation.
 - 2. Evacuate refrigerant system with vacuum pump; until temperature of 35 deg F is indicated on vacuum dehydration indicator.
 - 3. During evacuation, apply heat to pockets, elbows, and low spots in piping.
 - 4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
 - 5. Break vacuum with refrigerant gas, allow pressure to build up to 2 psi.
 - 6. Complete charging of system, using new filter dryer core in charging line. Provide full operating charge.
 - 7. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance of refrigerant piping valves and refrigerant piping specialties.
- B. Review data in Operating and Maintenance Manuals. Refer to Division 01 section "Project Closeout."
- C. Schedule training with Owner with at least 7 days advance notice.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section describes the galvanized steel, flexible, and aluminum ductwork for HVAC duct systems in accordance with SMACNA Duct Construction Standards, except as otherwise specified.
- B. The construction material for each ductwork system shall be as listed in the "Ductwork Material Schedule" at the end of this Section.
- C. This Section also describes the fittings, access doors, hangers and supports, manual volume dampers and sealants for each ductwork system as required.

1.02 RELATED WORK

- A. Section 230594 - Balancing of Air Systems

1.03 REFERENCES

- A. ASHRAE - Handbook Fundamentals; Latest Edition.
- B. SMACNA - HVAC Duct Construction Standards Metal And Flexible (latest issue)
- C. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- D. ASTM B209 - Specifications for Aluminum and Aluminum-Alloy Sheet and Plate.
- E. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- F. UL 555 S - Fire Dampers & Smoke Dampers.
- G. NFPA 96 - Standard for Commercial Cooking Operations
- H. New York State Mechanical Code.

1.04 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A and New York State Mechanical Code standards.

1.05 SUBMITTALS

- A. Ductwork shop drawings for approval:
 - 1. Coordinate layout duct drawings that differ from ductwork shown on the Drawings.
 - 2. The review of deviations will be for pressure drop only. The review will not address clearances or accessibility to maintain or balance the air systems. No dimensional or coordination check of the shop drawings will be made. The Contractor has the sole responsibility to review the Drawings, coordinate ductwork fabrication, and provide clearances and access for installation, maintenance and balancing of this work, and work of other trades. Unless specifically dimensioned, Drawings indicate approximate locations only. The Contractor has the sole responsibility to locate and route the ductwork.
 - 3. Deviations such as changing direction or transforming or dividing ductwork must maintain ductwork cross-sectional area and not exceed transformation taper of 15 degrees.
 - 4. Plans and section showing all equipment and accessories.

5. Minimum 3/8 in. scale, double line, showing sizes, transverse joints, transitions, elevations, clearances and accessories; sections where required.
- B. Shop details and catalog cuts of:
1. Ductwork construction, including gauge and bracing schedule
 2. Supports
 3. Dampers
 4. Turning vanes
 5. Fire dampers
 6. Access doors
 7. Flexible connections
 8. Blank off panels
 9. Other accessories

1.06 QUALITY ASSURANCE

- A. Construct all ductwork in accordance with referenced SMACNA Standards, except as otherwise stated. Ductwork pressure classifications shall be in accordance with referenced SMACNA Standards, except as otherwise specified.
- B. For all uninsulated ductwork casings and plenums located outdoors, the reinforcement members shall be galvanized steel or stainless steel.
- C. Construction pressure classification of ductwork are shown on the Drawings. If not shown, the pressure classification shall be greater than or equal to the maximum operating static pressure (minimum 2" w.c. pressure classification).
- D. All ductwork shall be free from pulsation, chatter, vibration and objectionable noise. If any of these defects appear after a system is in operation, correct by removing and replacing, or reinforcing the ductwork, at no additional cost to the Owner.
- E. For all galvanized steel ductwork, zinc coating shall be minimum G90 per ASTM A653.

PART 2 - PRODUCTS

2.01 GALVANIZED STEEL RECTANGULAR DUCTS AND FITTINGS

- A. Construct ducts of galvanized sheet steel meeting ASTM A 653 with G90 coating designation, and in accordance with the latest SMACNA HVAC Duct Construction Standards Metal And Flexible and pressure classifications as stated on the Drawings (minimum 2" w.c. pressure classification).
- B. No ducts shall be less than No. 22 U.S. Gauge.
- C. Piping, conduit and structure shall not penetrate ductwork. Where this condition cannot be avoided and with the written permission of the Architect/Engineer, follow SMACNA HVAC Duct Construction Standards Metal and Flexible, except that sides of transition sections shall slope a maximum of 15 degrees.
- D. Provide 90-degree full-radius elbows with a centerline radius 1.5 times the duct width in the plane of the bend.
- E. For elbows with centerline radius less than 1.5 times the width of the duct in the plane of the bend, provide turning vanes.
- F. Provide square throat elbows with manufactured turning vanes.

- G. All dissimilar metals shall be connected with flanged joints made up with fiber or neoprene gaskets to prevent contact between dissimilar metals. Flanges shall be fastened with bolts protected by ferrules and washers made of the same materials as the gaskets.
- H. For split fittings, the split shall be proportional to the air flow. Construct per SMACNA HVAC Duct Construction Standards- Metal and Flexible.
- I. Transitions and Offsets shall follow SMACNA HVAC Duct Construction Standards Metal and Flexible, except that sides of transitions shall slope a maximum of 15 degrees.
- J. All branch take-offs perpendicular to the main shall be a 45 degree entry.
- K. Longitudinal seams shall be of the Pittsburgh Lock type outlined in the SMACNA HVAC Duct Construction Standards Metal and Flexible.
- L. Duct transverse joints shall be selected and used consistent with the static pressure class, applicable sealing requirements, materials involved, duct support intervals and other provisions for proper assembly of ductwork outlined in the SMACNA HVAC Duct Construction Standards - Metal and Flexible. Transverse joints T-25a, T-25b (Ductmate) shall only be used. Metal clips will only be allowed (NO PVC). Ductmate shall not be used for the following (use transverse joints T-15 through T-24 in these cases):
 - 1. The Ductmate '45' system shall not be used for applications with duct gauges heavier than 10 or lighter than 22.
 - 2. The Ductmate '35' system shall not be used for applications with duct gauges heavier than 16 GA. or lighter than 26 GA.
 - 3. The Ductmate '25' system shall not be used for application with duct gauges heavier than 20 GA. or lighter than 26 GA.

2.02 TURNING VANES

- A. Manufactured with same material as ductwork that it is installed in and to the same pressure classification as ductwork that they are installed in.
- B. Provide turning vanes in all square duct elbows and as noted on the Drawings.
- C. Vanes shall be single thickness Small Vane as detailed in SMACNA HVAC Duct Construction Standards Metal and Flexible.
- D. Where a rectangular duct changes in size at a square-throat elbow fitting, use single thickness turning vanes with trailing edge extensions aligned with the sides of the duct.

2.03 ACCESS DOORS

- A. For access doors for use in ductwork receiving Fire Rated Blanket Insulation see Ductwork Insulation Section for requirements. Fabricate all other access doors in accordance with SMACNA Duct Construction Standards Metal And Flexible and as indicated.
- B. For HVAC duct systems, construct doors of the same material as the ductwork. Minimum size of access doors shall be 8 inches by 8 inches, unless shown otherwise.
- C. Provide walkthrough doors where shown. These doors shall have a minimum clear width of 18 inches. Provide doors with 8 inch square double pane wire glass windows. Locate windows not to exceed 5 feet-6 inches to centerline above finished floor of installed casing. Walk-through doors shall be operable from both sides of the door.

- D. Access doors shall be insulated same as duct.
- E. Provide with continuous neoprene gaskets around perimeter of access doors for airtight seal.
- F. Provide all access doors with cam lock latches.
- G. Provide access doors with watertight gaskets in shower room exhaust ductwork. Doors shall be of extra-heavy stainless construction.
- H. All access doors serving a fire damper shall be painted red and shall have a label with white letters not less than ½ inch high reading "FIRE DAMPER". No external ductwork insulation shall conceal a fire damper access door unless there is a label attached to the insulation indicating the exact location of the access door.
- I. Provide access doors in following locations:
 - 1. Heaters and coils in ducts: entering and leaving side.
 - 2. Automatic dampers: linkage side.
 - 3. Fire damper, on both sides of ducts.
 - 4. Smoke detection heads.
 - 5. On both sides of ducts where necessary to provide maintenance accessibility to equipment on either side.
 - 6. VAV boxes
 - 7. Heating and Cooling coils.
 - 8. Fan Plenums.
 - 9. In-Line Fans (suction and discharge sides)
 - 10. Other items requiring access for service/maintenance
- J. Where duct access doors are concealed the Contractor shall furnish and pay for installation of access doors to be mounted in the fire rated walls and ductwork enclosures. The access doors must be fire resistive and minimum 6" larger on each side than the duct access door for the above mentioned applications.

2.04 MANUAL VOLUME DAMPER

- A. Fabricate in accordance with SMACNA Duct Construction Standards Metal And Flexible, and as indicated.
- B. Fabricate single blade dampers for duct sizes up to 6 inches in height.
- C. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes of 4 inches for ducts above 6 inches in height. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- D. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- E. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches, provide regulator at both ends.
- F. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
- G. Volume damper shall be provided at each duct branch and also where shown on the Drawings. Volume dampers must be installed at each branch even if they are not shown on the Drawing.

- H. Approved Manufacturers:
1. Ruskin Mfr. Co.
 2. Arrow Damper & Louver.
 3. Imperial Damper Co.

2.05 BACKDRAFT DAMPERS

- A. Dampers shall be low-leakage, parallel-blade type. Damper sizes shall be suitable for duct sizes noted on the Drawings. The dampers shall be suitable for a minimum 4000 fpm velocity.
- B. Damper frames shall be minimum No. 12 gauge galvanized steel blades shall be minimum No. 16 gauge galvanized steel or Type 6063-T5 aluminum with press-fit ball bearings.
- C. Dampers shall be complete with adjustable counterweights and linkage for duty at .20 inches w.g. and 3500 fpm.
- D. Provide neoprene or silicone rubber blade seals.
- E. Approved manufacturers - Ruskin Manufacturing Company.

2.06 DUCT TEST HOLES

- A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.07 DUCT HANGERS AND SUPPORTS

- A. Provide trapeze, strap or angle iron hangers meeting SMACNA HVAC Duct Construction Standards Metal and Flexible.
- B. Materials of hangers, supports and fasteners shall conform to the manufacturer's load ratings.
- C. Hangers, supports, upper attachments and inserts shall be hot-dip galvanized steel or stainless steel.
- D. Fasteners for HVAC duct systems shall be hot-dip galvanized steel, cadmium-plated steel or stainless steel.
- E. Secure ductwork hangers attached to concrete structures and slabs with embedded inserts, anchor bolts or concrete fasteners. A safety factor of 5 should be used in selection of all inserts and expansion bolts (if applicable safety factor shall be determined by analysis of seismic loads and the greater safety factor shall be used).
- F. Provide hangers and supports not more than 12 inches from each face of a horizontal elbow.
- G. Plenums shall be supported to permit personnel to enter the plenum. If no structural steel design is shown on the Drawings, it is the responsibility of the Contractor to provide the services of a licensed structural engineer in the in which the project is to be constructed to submit a structural design for review.

2.08 SEALANTS

- A. Where ducts are not continuously welded or soldered, provide sealants and gaskets as required to meet the specified duct leakage allowance.
- B. Provide Gaskets, Sealers, Mastics and Tapes as manufactured by Ductmate.

2.09 FIRE DAMPERS

- A. Fabricate and install in accordance with NFPA 90A and UL Safety Standard 555, and AMCA Standard 500.
- B. Fire Resistance: For penetrations through construction rated less than 3 hours, 1 ½ hours. For penetrations through construction rated for 3 hours or more, 3 hours.
- C. Pressure Differential Rating: 4 in. w. g.
- D. Velocity Rating: 2000 fpm
- E. Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades in air stream. Fabricate fire dampers for vertical and horizontal position.
- F. Fabricate multiple blade fire dampers with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
- G. Fusible links, UL 33, shall separate at 165 degrees F.
- H. Acceptable Manufacturers:
 - 1. Greenheck Model DFD 150, 200 and 350
 - 2. Ruskin Mfr. Co.
 - 3. Arrow Damper & Louver.
 - 4. Imperial Damper Co.

2.10 STAINLESS STEEL DUCTWORK

- A. Fabricate ducts serving dishwasher hoods of minimum 20 gauge AISI Type 302 or 304 stainless steel sheet metal.
- B. Fabricate ducts serving laboratory exhaust fume hoods of minimum 20 gauge AISI Type 316 stainless steel sheet metal.
- C. Use stainless steel with a No. 4 finish where installed exposed in finished rooms and No. 2B finish in other locations. Use stainless steel fasteners for ductwork installed exposed in finished rooms and where fastener penetrates duct. Galvanized fasteners may be used in unfinished spaces for non-penetrating service.
- D. Use stainless steel reinforcing members for ducts in finished spaces and galvanized steel in unfinished spaces.
- E. Longitudinal Seams For Dishwashing, and Other Scullery Equipment Exhaust Ducts: Form double corner seams, or Pittsburgh lock seams.
 - 1. Fabricate elbows and transitions with Pittsburgh lock seams.

2. Fabricate double compounded elbows and other complex fittings with double corner seams.
 3. Locate seams in horizontal ducts at top corners of ducts, unless otherwise approved in writing.
 4. Locate seams in vertical ducts at rear corners of ducts.
- F. Construct ductwork as per "GALVANIZED STEEL RECTANGULAR DUCTS AND FITTINGS" section above unless otherwise noted in this section.
- G. At dishwasher locations, pitch horizontal ductwork minimum ¼ inch per foot such that low point is at the dishwasher.

2.11 ALUMINUM DUCTWORK

- A. Construct ducts of minimum No. 20 gauge aluminum sheet meeting ASTM B209, Series 3000 Alloy.
- B. Construct ductwork as per "GALVANIZED STEEL RECTANGULAR DUCTS AND FITTINGS" section above unless otherwise noted in this section.
- C. At shower room locations, pitch horizontal ductwork minimum ¼ inch per foot such that low point is at shower room.

2.12 STANDARD FLEXIBLE CONNECTIONS

- A. Provide fabric flexible duct connections.
- B. Fabric shall be UL approved, fire-retardant, closely-woven glass, double coated with neoprene, and a minimum of 4 inches wide.
- C. Shall be installed at duct connections to all ceiling hung fans and where vibration will be transmitted through ductwork.
- D. Approved Manufacturers:
1. "Ventglas" by Vent Fabrics, Inc.

2.13 HEAVY DUTY FLEXIBLE CONNECTIONS

- A. Heavy Duty Flexible Connections shall be used in high pressure (greater than 2 in. w.c.), high temperature (greater than 150 degree F) air applications or where the gas is highly corrosive and the duct connector must be leak proof.
- B. Flexible Connectors shall be flanged. If installed outdoors, all metallic components shall be stainless steel construction. Provide flexible connector materials of construction as recommended by the manufacturer for the pressure, temperature, and gas that is being used in air handler system.
- C. Approved Manufacturers:
1. Mercer Rubber Company

2.14 FLEXIBLE DUCTS

- A. Comply with SMACNA HVAC Flexible Duct Construction Standards and NFPA 90A.
- B. Provide where indicated on the Drawings Flexmaster Type TL- M Flexible Metal UL181 Class I Air Duct.

- C. The duct shall be constructed of .005" thick 3003-H14 aluminum alloy in accordance with ASTM B209.
- D. The duct shall be spiral wound into a tube and spiral corrugated to provide strength and flexibility.
- E. The internal working pressure rating shall be at least 10" w.g. positive and 10" w.g. negative with a bursting pressure of at least 2½ times the working pressure.
- F. The duct shall be rated for a velocity of at least 5500 feet per minute.
- G. The duct must be suitable for continuous operation at a temperature range of -40° F to +250° F.
- H. Factory insulate the flexible duct with fiberglass insulation. The R value shall be at least 4.2 at a mean temperature of 75° F.
- I. Cover the insulation with a fire retardant metalized vapor barrier jacket reinforced with crosshatched scrim having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, Procedure A.
- J. Install flexible metal duct as per SMACNA HVAC Duct Construction Standards Metal and Flexible (Latest Edition).
- K. Flexible ductwork shall only be installed where shown on the Drawings.
- L. Provide flexible duct supports at all elbows and changes in direction that maybe subject to restriction, collapsing, or pinching to mitigate chance of reduction in cross section area, flow velocities and noise. Duct support shall be minimum radius = duct diameter, nylon polymer construction, with nylon straps. Malco FDS1 or equal.

2.15 GALVANIZED STEEL ROUND DUCTS AND FITTINGS

- A. Construct ducts of galvanized sheet steel meeting ASTM A 653 with G90 coating designation, and in accordance with the latest SMACNA HVAC Duct Construction Standards Metal and Flexible (Latest Edition), and pressure classifications as stated on the Drawings (minimum 2" w.c. pressure classification). When the ductwork pressure classification of these standards is exceeded, construct galvanized steel round exhaust ductwork in accordance with SMACNA Round Industrial Duct Construction Standards.
- B. For ductwork through 60 inches in diameter, provide ducts of spiral lock-seam construction.
- C. For ductwork over 60 inches in diameter, provide ducts of welded longitudinal seam construction.
- D. For ductwork through 36 inches in diameter, use beaded sleeve transverse joints.
- E. For ductwork over 36 inches in diameter, use gasketed-flanged Van Stone transverse joints. Gasket shall be "440 Gasket Tape" by Ductmate Industries, Inc.
- F. For ductwork under a positive pressure through 96 in. diameter and 10 in. w. g. no reinforcing is required. For ductwork under a negative pressure in exposed areas use duct gauge that will minimize the use of reinforcing as appropriate for the pressures involved.
- G. Draw band joints will not be permitted.
- H. All elbows shall be constructed with a centerline radius equal to 1.5 times the duct diameter.

- I. Provide matching galvanized steel fittings with continuously welded seams and joints.
- J. All take-off connections to duct headers shall be made using tee (90 degrees), lateral (45 degrees), tee cross, lateral cross and "Y" branch fittings of the conical type. All fittings fabricated as separate fittings shall have continuous welds along all seams and joints.
- K. The use of two-piece mitered, vaned elbows will be permitted only with specific written approval from the Architect/Engineer. Provide turning vanes as per SMACNA HVAC Duct Construction Standards Metal and Flexible.

2.16 LOUVER BLANK OFF PANELS

- A. Facing: 0.032 inch thick aluminum on both sides
- B. Perimeter Frame: 0.050 inch thick-formed aluminum channels
- C. Core: Expanded polystyrene (EPS), R value of 8

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Install ductwork in accordance with applicable SMACNA Duct Construction Standards Metal And Flexible and approved submittals, and as shown on the Drawings. Duct sizes shown are inside clear dimensions. Where internal duct liners are used, duct sizes shown are inside clear of liner. For ductwork located outside, provide reinforcing sufficient to support wind and snow loads.
- B. The Drawings indicate general locations of ducts. Make additional offsets or changes in direction as required at no additional cost to the Owner.
- C. Wherever ductwork is divided, maintain the cross-sectional area.
- D. Do not exceed 15-degree taper when constructing duct transitions.
- E. Close the open ends of ducts during construction to prevent debris and dirt from entering.
- F. Secure casings and plenums to curbs according to the requirements of the SMACNA HVAC Duct Construction Standards Metal and Flexible.
- G. Make changes in direction with long radius bends.
- H. All unused portions of HVAC supply air and exhaust louvers shall be blanked off with Louver Blank Off Panels, see Ductwork Insulation Section.
- I. All welded and scratched galvanized steel surfaces shall be touched up with zinc-rich paint.
- J. 2 Hr. rated wall penetration: Where small size duct (up to 6 inches x 6 inches) is penetrating a 2 Hr wall the duct shall be constructed of 16 gauge galvanized sheet metal.
- K. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- L. Patch and repair all wall penetrations.

- M. Insulation: Where Drawings and Specifications indicate that ducts are to be insulated make provisions for neat insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, and similar operating devices. Metal collar equivalent in depth to insulation thickness and of suitable size to which insulation may be finished to be mounted on duct.

3.02 FITTING INSTALLATION

- A. Use minimum of four sheet metal screws per joint.
- B. Apply approved sealant on duct-to-duct joint before assembly. Apply additional sealant after assembly to make joint airtight.

3.03 HANGER AND SUPPORT INSTALLATION

- A. Support ductwork hung from building structure using trapeze, strap or angle iron hangers conforming to SMACNA HVAC Duct Construction Standards Metal and Flexible. Provide supplemental structural steel to span joists where required.
- B. Do not support ductwork from furring, hung ceilings, metal floor deck, metal roof deck or from another duct or pipe.
- C. Do not hang lighting fixtures or piping from ductwork.
- D. Do not use perforated band iron.
- E. Support ductwork at each change in direction.
- F. Where duct connects to or terminates at masonry openings or at floors where concrete curbs are not used, provide a continuous 1 ½ inch by 1 ½ inch by 3/16 inch galvanized steel angle support around the ductwork. Bolt and seal the supports to the building construction using expansion bolts and caulking compound. Seal shall be watertight at floor or wall and duct such that a spill will no pass down through the opening.
- G. Fasten plenums and casings connected to concrete curbs using continuous 1 ½ inch by 1 ½ inch by ¼ inch galvanized steel angle support. Set the angle support in a continuous bead of caulking compound and anchor it to the curb with 3/8 inch diameter anchors on 16 inch centers. Terminate sheet metal at curb and bolt to angle support. Seal sheet metal to curb with a continuous bead of caulking.
- H. For insulated ductwork, install hangers on the outside of the insulation. To maintain the insulation value, inset a piece of 1 inch thick, 6 pcf fiberglass board with a foil/scrim/kraft (FSK) jacket at these supports.

3.04 SEALING

- A. Where ductwork is not continuously welded, soldered or gasketed, make seams and joints airtight with sealants.
- B. Install the sealants in accordance with the sealant manufacturer's instructions and recommendations.
- C. Seal all ductwork seams, joints, fastener penetrations and fittings connections with sealants in accordance with SMACNA Seal Classifications as required by SMACNA Duct Pressure Classification. All ductwork, regardless of pressure classification, shall have a minimum Seal Class B.

- D. Completely fill all voids when liquid sealing ductwork. Several applications may be necessary to fill voids caused by shrinkage or runout of sealant.

3.05 DUCT-MOUNTED DEVICES AND ACCESS DOORS

- A. Install all dampers, coils, airflow measuring stations, humidifiers and other duct-mounted devices, specified in other sections of the specifications or as shown and provide transformations to dimensions as required. Install devices in accordance with manufacturer's recommendations. Install dampers and coils a minimum of 4 feet away from changes in direction or transitions. Allow five (5) equivalent diameters of straight ductwork upstream and one (1) equivalent diameter of straight ductwork downstream of airflow measuring devices.
- B. Install access doors in ductwork, plenums and where specified and as shown. Provide access doors for inspection and cleaning automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 18 x 18 inch size for shoulder access and as indicated. Install access doors in the bottom of the ductwork unless they are inaccessible in this location; then install the access doors in either the side or top of the ductwork, whichever is more accessible.
- C. Provide fire damper at locations indicated, and where outlets pass through fire rated components and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway, duct connections, corrosion resistant springs, bearings, bushings and hinges.
- D. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Engineer.
- E. Provide flexible connections immediately adjacent to equipment in ducts associated with motorized equipment. Cover connections to medium pressure fans with leaded vinyl sheet, held in place with metal straps.
- F. Pilot Ports: Locate pilot ports for measuring airflow in each main supply duct at the downstream end of the straightest run of the main and before the first branch take-off. Form pilot ports by drilling 7/16 inches holes in the duct, lined up perpendicular to airflow on maximum 8-inch centers and at least three to a duct, evenly spaced. Holes to be plugged with plastic plugs. Provide access to these for future rebalancing.

3.06 CONTROL DAMPER INSTALLATION

- A. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure 1/4" larger than damper dimensions and shall be square, straight, and level.
- B. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be equal $\pm 1/8"$.
- C. Follow manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.
- D. Install extended shaft or jackshaft per manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)
- E. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to assure proper operation. On multiple section assemblies, all sections must open and close simultaneously.

- F. Provide a visible and accessible indication of damper position on the drive shaft end.
- G. Support ductwork in area of damper when required to prevent sagging due to damper weight.
- H. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.
- I. Dampers that are to be installed with air flow measuring stations shall be installed in duct runs with a minimum amount of straight duct upstream and downstream of the damper to allow accurate flow readings by the air flow measuring station. The Contractor shall verify with the manufacturer the length of straight duct runs required.

3.07 DUCTWORK AND EQUIPMENT LEAK TESTING

- A. Leak test each ductwork system within ten working days of ductwork installation and before ductwork is insulated and concealed.
- B. All HVAC ductwork shall be tested. Follow general procedures and use apparatus as outlined in the SMACNA HVAC Air Duct Leakage Test Manual.
- C. Test all ductwork at 100 percent of the pressure classifications indicated.
- D. Air testing during erection shall include separate leakage air tests of air riser, horizontal distribution system, and, after all ductwork is installed and the central stations apparatus is erected, leakage testing of the whole system.
- E. Use Appendix C in the SMACNA HVAC Air Duct Leakage Test Manual to determine allowable leakage rates for each duct section tested.
- F. All devices, including access doors, airflow measuring devices, sound attenuators, damper casings, sensors, test ports, etc. that are furnished and/or installed in duct systems shall be included as part of the duct system leakage allowance. All joints shall be inspected and checked for audible leakage, repaired, if necessary, and retested. Duct leakage shall be limited to the following:

Average Size of Run Diameter or Equivalent	*A/100 ft. Run
12 inches or less	10
20 inches or less	15
30 inches or less	25
40 inches or less	30
50 inches or less	30
* (A) = Permissible loss in cfm	

- G. Total system leakage shall not exceed 10 percent of the scheduled design capacity of the system when tested as per SMACNA testing methods.

3.08 DUCTWORK AND EQUIPMENT LEAK TESTING - GREASE EXHAUST AND WATER LEAK PROOF DUCTWORK

- A. Prior to use, covering or concealment of any ductwork perform a leakage test in the presence of the Owner and Authority Having Jurisdiction.

- B. Perform a light test or other approved test to determine that all welded or brazed joints are liquid tight.
- C. Light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of duct to be tested.
 - 1. The lamp shall be open so as to emit light in all directions.
- D. Repair any visible light leakage.

3.09 PAINTING

- A. Upon completion of the installation, remove all protecting materials, thoroughly remove all scale and grease and leave in a clean condition for painting. Ductwork to be painted shall be as shown on the Drawings. Painting shall be in accordance with the requirements of the "Painting" Specification Section.

3.10 DUCTWORK MATERIAL SCHEDULE

AIR SYSTEM	DUCTWORK MATERIAL
Supply, Outside Air & Exhaust Ductwork	Galvanized Steel
Ductwork Exposed to Weather	Aluminum

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide exhaust fans, as specified herein, with accessories and of sizes and capacities as noted here-in, and as scheduled and in locations shown on drawings.
- B. Products listed in Part 2 of this Section include:
 - 1. Centrifugal Up / Down Blast Fans

1.02 ACCESSORIES:

- A. Provide accessories as scheduled. Refer to controls diagrams and specifications, sequence of operations specifications and electrical drawings for detailed requirements.
 - 1. Back draft dampers
 - 2. Motorized dampers with appropriately sized actuators
 - 3. Motor speed controls, interlock and control and monitoring devices
 - 4. Disconnect switches
 - 5. Roof curbs
 - 6. Curb Adapters
 - 7. Wind or Seismic restrains, guy wires, etc.

1.03 RELATED WORK

- A. Section 061000: Rough Carpentry
- B. Section 076200: Flashing and Sheet Metal
- C. Section 079200: Joint Sealants
- D. Section 230010: General Mechanical Requirements
- E. Section 230594: Balancing of Air Systems
- F. Section 230991: Instrumentation and Controls Integration
- G. Section 230993: Sequence of Operations

1.04 REFERENCE CODES AND STANDARDS

- A. AMCA 99 - Standards Handbook
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating
- C. AMCA 300 - Reverberant Room Method for Sound Testing of Fans
- D. ASHRAE Handbook, HVAC Applications Volume "Sound and Vibration Control"
- E. UL listed and labeled.

1.05 SUBMITTALS

- A. Shop Drawings - Show fan layout, housing, materials, gauges, dimensions, weights and installation details

- B. Product data - Manufacturer's fan performance (data includes cfm, rpm, bhp, motor nameplate data, tip speed, outlet velocity and static pressure) and sound performance (data includes sound power level ratings by octave bands) as tested in accordance with AMCA Standards 210 and 300.
- C. Fan performance curves - Submit curves for all fans with system performance shown, and for plus or minus 10 percent and plus or minus 20 percent change in fan rpm. Curves shall include plotted rpm, horsepower, cfm, static pressure, and fan surge line and operating point.
- D. Certified AMCA Ratings - Submit ratings for air and sound performance.
- E. UL Listing - Submit listing if specified.

1.06 QUALITY ASSURANCE

- A. Factory balance each fan statically and dynamically, test run before shipment, and key fan wheel to fan shaft. Fans shall operate quietly and without pulsation or vibration. Conduct sound power level tests for each type fan at the factory in accordance with AMCA 300.
- B. Fans shall operate in the stable range of their performance curves.
- C. The fan external static pressures shown in the schedules are those required by the ductwork and apparatus, and do not include the internal and intake fan losses, inlet vanes or integral outlet dampers, inlet screens, outlet velocity heads or drive losses.
- D. Factory performance test each fan assembled in or as part of apparatus specified to be performance tested. Test shall display scheduled performance characteristics, using certified, calibrated testing instruments provided by the manufacturer of the apparatus.
- E. All fan performance ratings shall be based up on factory tests performed in accordance with AMCA 210 and 300. One fan of each type specified shall have actual factory performance tests performed prior to shipment. All fans shall be certified by AMCA and carry its seal.

PART 2 - PRODUCTS

2.01 CENTRIFUGAL UP/DOWNBLAST FANS

- A. Roof mounted exhaust fans shall be of the up or down blast direct drive type, as scheduled.
- B. The fan housing shall fan housing shall consist of the motor cover, shroud, curb cap and lower windband, and shall be constructed of heavy-gauge aluminum. Housing shall have a rigid internal support structure and leakproof design. The fan shroud shall be one-piece with a rolled bead for extra strength, which directs exhaust air downward. The low windband shall be one piece with formed edges for added strength and the curb cap shall include prepunched mounting holes to ensure correct attachment to the roof.
- C. The fan wheel shall be centrifugal, non overload, backward-inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.
- D. Upblast fans for use with kitchen exhaust or grease laden air shall be provided with a grease drain, grease cup and inspection and clean out access doors.
- E. Motors shall be permanently lubricated and carefully matched to the fan loads. Motors shall be readily accessible for maintenance. Motors shall be mounted on true vibration isolators, out of the airstream. Each vibration isolator shall be sized to match the weight of each fan.

- F. A NEMA 1 disconnect switch shall be provided as standard. Factory wiring shall be provided from motor to the handy box.
- G. All fans shall bear the AMCA Certified Ratings Seal for both sound and air performance.
- H. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.
- I. Fans shall be manufactured by Greenheck or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install fans, including all necessary structural supports and bracing as scheduled and located on the contract drawings in accordance with manufacturer's instructions and approved submittals.
- B. Connect duct to fans to allow for straight and smooth air flow.
- C. Provide flexible connections (minimum of 4") between fan and duct.
- D. Install fan level: +/- 5 degrees vertical. Final installation shall be free of all leaks from both fan and associated ductwork.

3.02 START-UP, TESTING, DEMONSTRATION

- A. Start-up fans after checkout to insure proper alignment and phased electrical connections.
- B. Test fans individually and as part of system.
- C. Insure supply / exhaust fans and dampers are properly interlocked, operate with control system as required to maintain building pressurization and exhaust per design documents and for proper building operation.
- D. Provide all associated start-up and testing reports.
- E. Demonstrate operation to Owner and instruct maintenance personnel in operation of equipment.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section describes the outdoor air inlets and outlets, blank offs, louver infill system, as specified herein, with capacities, and sizes as scheduled on the Drawings.
- B. Products listed in Part 2 of this Section include:
 - 1. Outdoor Air / Exhaust Louvers
 - 2. Glazing Panels
 - 3. Louver Infill Framing System

1.02 RELATED WORK

- A. Section 061000: Rough Carpentry
- B. Section 076200: Flashing and Sheet Metal
- C. Section 079200: Joint Sealants
- D. Section 230010: General Mechanical Requirements
- E. Section 230594: Balancing of Air Systems

1.03 REFERENCE CODES AND STANDARDS

- A. ASHRAE 70 – Method of Testing for Rating the Airflow Performance of Outlets and Inlets.
- B. NFPA 90A – Installation of Air Conditioning and Ventilation Systems
- C. NFPA 90B – Installation of Warm Air Heating and Air Conditioning Systems
- D. AAMA 2604 – High Performance Organic Coatings on Architectural Extrusions and Panels
- E. AAMA 2605 - High Performance Organic Coatings on Architectural Extrusions and Panels
- F. AMCA 500 - Test Methods for Louvers, Dampers and Shutters
- G. AMCA 511 - Certified Ratings Program for Air Control Devices
- H. ASTM C1193 - Standard Guide for Use of Joint Seals
- I. Mechanical Code of New York State

1.04 SUBMITTALS

- A. General Product Data – Submit catalog cuts and installation instructions for all products specified, including standard color samples.
- B. Louvers:
 - 1. Submit published manufacturer's performance data for all of the different types of louvers.
 - 2. Performance Data – For each size and type, submit the following:
 - a. Free area
 - b. Maximum airflow in cfm
 - c. AMCA 511 performance data

- C. Panels:
 - 1. Samples:
 - a. Insulated Infill Panels: 12" x 12" size required. Samples shall have included all proposed coatings and be assembled with appropriate spacers and decorative elements.
 - b. Exterior and Interior Finish samples: 3" x 3" samples of the full manufacturers range of Standard Kynar colors offered
 - 2. Submission Drawings: Indicate thickness, dimension and components of parts. Detail methods, framing and tolerances to accommodate thermal movement.
- D. Framing:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Weather-stripping details.
 - 4. Thermal-break details.
 - 5. Submit any other components as required for Architect's approval. No fabrication shall be started until such approval is received. Contractor will verify all opening dimensions in the field and be responsible to provide proper size frame to fit all existing openings and note same on Shop Drawings.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect finish and edge in accordance with panel manufacturer's recommendations.
- B. Store materials in accordance with panel manufacturer's recommendations.

1.06 QUALITY ASSURANCE

- A. Field measurements shall be taken prior to completion of manufacturing and cutting.
- B. Maximum deviation from vertical and horizontal alignment of installed panels is 1/8" (3mm) in 20' (6m) non-commutative

PART 2 - PRODUCTS

2.01 OUTSIDE AIR INTAKE / EXHAUST LOUVERS

- A. Louvers - General:
 - 1. Furnish and install louvers of the sizes and capacities as shown on the Drawings.
 - 2. Coordinate color with Owner & Architectural drawings or specification.
 - 3. Options: Refer to schedules

2.02 GLAZING PANELS:

- A. Recommended for use as an infill panel component in following window framing systems.
- B. Insulated glazing panel consisting of closed cell foam plastic core bonded on both sides to a thermoplastic stabilizer with a texture/color finished aluminum sheet each face.
 - 1. Assembly thickness: 1" (2.0 PCF EPS core with 0.022" 3003 or 5005 Aluminum skins
 - 2. Finish: Smooth or Stucco Embossed; PVDF, Polyester or Anodized
 - 3. R-Value: 3.3
 - 4. Wind Load at 48" span 50 PSF
 - 5. Laminators Inc. Thermolite or approved equal
- C. Accessories

1. Related material to complete installation as recommended by the manufacturer.
2. Neoprene setting blocks and spacer shims as approved by manufacturer
3. Seals against moisture intrusion as recommended by the manufacturer. Polyurethane and silicone based sealant with a 20 year life are recommended.
4. Tapes shall be Tremco's 440 Tape or Polybutylene 3MN-EC1201.
5. Sealants and tapes shall conform to N.A.A.M.M. Specification for classes of work involved.
6. Glazing sealant on exterior shall be Tremco "Mono" or GENERAL ELECTRIC "Silicone Construction Sealant", color as selected by the Architect/Engineer.

2.03 WINDOW (X-LOUVER) FRAMING SYSTEMS:

- A. Window framing system for 1" glazing (to be used with glazing panel above) for removed louver opening infill.
 1. Frame sections: 2 1/4" H x 4 1/2" D, offset.
 2. Provide top, side and bottom frame details appropriate for installation on existing surfaces per manufacturer recommendations. Provide shear block inside set for pitched sills.
 3. Extruded aluminum
 4. Anodized finish
 5. Arcadia TC470 Series or approved equal

PART 3 - EXECUTION

3.01 LOUVER INSTALLATION

- A. Install louvers in locations shown on the Drawings.
- B. Install louvers plumb, level, in plane of wall, and in alignment with adjacent work.
- C. Install joint sealants as specified in Section 079200.
- D. Coordinate with other work, and provide flashing, sheet metal, gaskets, and all other seal materials appropriate for intended use, and work required to ensure a weather tight building exterior construction and air tight interior seal between sleeve/duct/plenum and building opening as required.
- E. Ensure existing sill is pitched towards exterior a minimum of 1/4" per foot. Provide supplementary wood framing and aluminum flashing or built up concrete sill as required.

3.02 GLAZING PANEL INSTALLATION

- A. Erect panels plumb, level and true in accordance with the manufacturers specifications of the glazing panels and framing system.
- B. Glaze panels securely and in accordance with approved shop drawings and manufacturers instructions to allow for necessary thermal movement and structural support.
- C. Do not install panels that are observed to be defective including warped, bowed, dented, scratched and delaminating components.
- D. Center panels in glazing rabbet to maintain recommended clearances at perimeter for expansion and contraction of each face of the panel.
- E. Weatherseal all joints as required using methods and materials as previously specified

3.03 FRAME AND PANEL INSTALLATION

- A. Before starting installation examine work to receive panel frames scrape and clean all surfaces to based materials suitable for attachment, structural integrity, and sealing weather tight.
- B. Build-up surfaces that do not meet manufacturer tolerances for level, plumb, and surface deviation per length with suitable materials.
- C. Ensure existing sill is pitched towards exterior a minimum of 1/4" per foot. Provide supplementary wood framing and aluminum flashing or built up concrete sill as required.
- D. Immediately prior to installing panels, all surfaces shall be wiped clean and free of protective coatings, moisture, and dust.
- E. Install framing system per manufacturer instructions with all appropriate connectors, supports, fasteners and other manufacturer specific components.
- F. Erect panels plumb, level and true in accordance with the manufacturers specifications.
- G. Glaze panels securely and in accordance with approved shop drawings and manufacturers instructions to allow for necessary thermal movement and structural support.
- H. Do not install panels that are observed to be defective including warped, bowed, dented, scratched and delaminating components.
- I. Weatherseal all joints as required using methods and materials as previously specified.
- J. Separate dissimilar metals using gasketed fasteners and blocking to eliminate the possibility of electrolytic reaction
- K. Center panels in glazing rabbet to maintain recommended clearances at perimeter for expansion and contraction of each face of the panel.
- L. After installation, protect exposed portions of aluminum surfaces from damage by grinding and polishing compounds, plaster, lime, acid, cement, or other contaminants.
- M. Remove masking film as soon as possible after installation. Masking intentionally left in place after panel installation will be the responsibility of the contractor.
- N. Weep holes and drainage channels must be unobstructed and free from dirt and sealant.
- O. Remove excess mounting solution at finished seams, perimeter edges, and adjacent surfaces.
- P. Touch-up, repair or replace damaged products before substantial completion.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section describes the air terminals as specified herein, with capacities, distribution patterns and connection sizes as scheduled on the Drawings.
- B. Products listed in Part 2 of this Section include:
 - 1. Grilles and Registers.
 - 2. Ceiling Diffusers.

1.02 RELATED WORK

- A. Section 233113: Sheet Metal Work

1.03 REFERENCES

- A. ADC 1062 GRD - Test Code for Grilles, Registers and Diffusers
- B. ASHRAE 70 - Method of Testing for Rating the Airflow Performance of Outlets and Inlets.
- C. ASHRAE 113 - Method of Testing Room Air Diffusion
- D. ASTM C423 - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- E. ARI 880 - Air Terminals
- F. ARI 885 - Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.
- G. NFPA 90A - Installation of Air Conditioning and Ventilation Systems
- H. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- I. Mechanical Code of New York State

1.04 QUALITY ASSURANCE

- A. Air Terminals will not be accepted until acoustical test results have been submitted and approved.

1.05 SUBMITTALS

- A. Product data - Submit catalog cuts and installation instructions for all products specified, including standard color samples.
- B. Submit published manufacturer's performance data for all of the different types of diffusers, registers and grilles, based on testing in accordance with ASHRAE Standard 70, latest edition.
- C. Performance data - For each size and type of air terminal , submit the following:
 - 1. Inlet static pressure in inches w.g.
 - 2. Maximum and minimum airflow in cfm.
 - 3. Throw in feet at maximum cfm (and 25 percent of cfm) for terminal velocities of 50 and 100 fpm.

4. Noise Criteria (NC) curve at maximum air terminal cfm rating with blades in full-open and closed positions.

PART 2 - PRODUCTS

2.01 CEILING DIFFUSERS

- A. Architectural Ceiling Diffusers:
 1. Furnish and install architectural ceiling diffusers of the sizes and capacities as shown on the Drawings.
 2. Manufacture the diffuser from corrosion-resistant steel or extruded aluminum as indicated on the Drawings.
 3. Construct the units of a stamped outer core and with the inner core having a plaque style face. Construct the face with a double skinned inner face panel with a hemmed edge. Manufacture the inner core assembly to be removable using a spring clip arrangement that permits quick, easy installation and removal.
 4. Manufacture diffusers with trim to allow for with face panel flush with the ceiling line into ceiling grids or for surface mount in other ceiling types.
 5. Provide an opposed blade radial volume damper, with an operating arm to adjust the damper without removing the core. Unit collar height; 1 1/4" in height.
 6. Provide an equalizing grid for field installation for each diffuser.
 7. Manufacturer: Nailor Industries Inc., Model Series UNI or approved equal.
 8. Coordinate color with Owner.

2.02 RETURN GRILLES

- A. Furnish and install return grilles of the type and size as shown on the Drawings. Construct the grilles with 45 degree deflection fixed blades and frames that have reinforced mitered corners.
- B. Provide an opposed blade damper operable from the face of the grille for grilles connected to ductwork.
- C. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable or frame face-mounting screws.
- D. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.
- E. Manufacturer: Nailor Industries Inc, Model Series 6145H-O or approved equal.
- F. Coordinate color with Owner.

2.03 HEAVY DUTY STEEL RETURN GRILLES

- A. Furnish and install heavy duty return grilles of the type and size as shown on the Drawings. Construct the grilles with 45 degree deflection fixed 14 gauge steel blades spaced on 1/2" centers and a heavy duty 16 gauge steel welded frame.
- B. Provide an opposed blade damper operable from the face of the grille for grilles connected to ductwork.
- C. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or

concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable or frame face-mounting screws.

- D. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.
- E. Manufacturer: Nailor Industries Inc, Model Series 6145H-HD-O or approved equal.
- F. Coordinate color with Owner.

2.04 HEAVY DUTY ALUMINUM RETURN GRILLES

- A. Furnish and install heavy duty return grilles of the type and size as shown on the Drawings. Construct the grilles with 0 degree deflection aluminum blades spaced on $\frac{1}{2}$ " centers and a heavy duty aluminum welded frame.
- B. Provide an opposed blade damper operable from the face of the grille for grilles connected to ductwork.
- C. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable or frame face-mounting screws.
- D. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.
- E. Nailor Industries Inc, Model Series 51FH-HD-OA or approved equal.
- F. Coordinate color with Owner.

2.05 SUPPLY GRILLES

- A. Furnish and install supply grilles of the type and size as shown on the Drawings. Construct the grilles with a dual set of streamlined shaped, roll-formed, corrosion-resistant blades that are adjustable, and spaced on $\frac{3}{4}$ " centers and frame with reinforced mitered corners.
- B. Manufacture grilles with trim to allow for recessed mounting into ceiling grids or for surface mount in other ceiling types. Provide concealed mounting using concealed mounting straps or concealed screw holes in neck. Countersunk screw holes in the frame face are not acceptable nor are frame face-mounting screws.
- C. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.
- D. Manufacturer: Nailor Industries Inc., Model Series 61DH-O or approved equal.
- E. Coordinate color with Owner.

2.06 TRANSFER GRILLES

- A. Furnish and install supply grilles of the type and size as shown on the Drawings. Grilles shall be sight proof.
- B. Construct the units of extruded aluminum or corrosion resistant steel as shown on the Drawings.

- C. The grille shall have inverted "V" shaped blades and frames. The grille shall be sight-proof.
- D. Manufacturer: Nailor Industries Inc., Model Series 61DGS or approved equal.
- E. Coordinate color with Owner.

PART 3 - EXECUTION

3.01 DIFFUSER, REGISTER AND GRILLE APPLICATION

- A. See the Drawings for types, sizes, materials and installation requirements.

3.02 INSTALLATION

- A. Install diffusers, grilles and registers in locations shown on the Drawings.
- B. Consult the Drawings for type of ceiling in which the terminals are to be installed and match air outlet edge trim to the requirements of the ceiling type in which they are installed.
- C. Install equalizing grids flush with take-off collar connection to supply duct with vanes perpendicular to air flow approaching diffuser.
- D. Install in accordance with manufacturer's published recommendations as well as applicable sections of SMACNA manual and as specified above.
- E. Install ceiling mounted grilles and registers with the blade deflection facing away from the line of sight.
- F. Ductwork insulation, as required per insulation schedule, shall be continuous from supply duct mains, flex ducts (if applicable), up to, and sealed with supply diffuser molded insulation blanket with continuous vapor barrier, regardless of ceiling plenum condition.
- G. Coordinate with other work, including ductwork and ductwork accessories, as necessary to interface installation of air outlets and inlets with other work

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Condensing unit package
- B. Charge of refrigerant and oil
- C. Controls and control connections
- D. Refrigerant piping connections
- E. Motor starters
- F. Electrical power connections
- G. Concrete Pads
- H. Roof Rails

1.02 RELATED SECTIONS

- A. Section 230993 - Sequence of Operations
- B. Section 232300 - Refrigeration Piping.
- C. Section 237313 - Air Handling Units

1.03 REFERENCES

- A. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- B. ANSI/ASHRAE/IES 90 A - Energy Conservation in New Building Design Standard.
- C. AHRI 210/240 - Unitary Air-Conditioning Equipment and Air-Source Heat Pump Equipment, (units less than 135,000 Btuh).
- D. AHRI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard (condensing units greater than 135,000 Btuh).
- E. AHRI 340 - Commercial and Industrial Unitary Heat Pump Equipment, (heat pumps greater than 135,000 Btuh).
- F. ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.
- G. California Energy Commission Administrative Code - Title 20/24 - Establishes the minimum efficiency requirements for HVAC equipment installed in new buildings in the State of California.
- H. AHRI 270 - Sound Rating of Outdoor Unitary Equipment, (units less than 135,00 Btuh).
- I. AHRI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment (equipment above 135,000 Btuh).

1.04 SUBMITTALS

- A. Submit unit performance data including: capacity, nominal and operating performance.

- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Protect units on site from physical damage. Protect coils.

1.06 WARRANTY

- A. Provide parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.
- B. Provide 5 year compressor warranty.

1.07 MAINTENANCE SERVICE

- A. Furnish complete parts and labor service and maintenance of packaged roof top units for one year from Date of Substantial Completion by contractor.
- B. Provide maintenance service with a two month interval as maximum time period between calls. Provide 24 hour emergency service on breakdowns and malfunctions.
- C. Include maintenance items as outlined in manufacturer's operating and maintenance data.
- D. Submit copy of service call work order or report and include description of work performed.

1.08 REGULATORY REQUIREMENTS

- A. Unit shall conform to ANSI Z21.47/UL 1995 for construction of packaged air conditioner.
- B. In the event the unit is not UL approved, the manufacturer must, at his/her expense, provide for a field inspection by a UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative, at no additional expense to the Owner.

PART 2 - PRODUCTS

2.01 SUMMARY

- A. The contractor shall furnish and install air-cooled condensing units as shown as scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.
- B. APPROVED MANUFACTURERS
 - 1. Daikin

2. Substitutions: Prior approval required as indicated under the general and/or supplemental conditions of these specifications. See Section 012500.
- C. Base Bid shall be Trane air-cooled condensing units with approved alternate being Carrier or York. Alternates must still comply with the performance and features as specified with these specifications and as indicated on the design documents. Job will be awarded on basis of specified product. Substitutions must be selected and approved within 14 calendar days after award of contract.

2.02 GENERAL UNIT DESCRIPTION

- A. Provide self-contained, packaged, factory-assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressor(s), condensing coil and fan(s), integral subcooling circuit(s), filter drier(s), and controls. Provide expansion valve(s) and check valves for split system heat pump unit(s).
- B. Performance Ratings: Energy Efficiency Rating (EER) not less than prescribed by ANSI/ASHRAE 90A.

2.03 CASING

- A. House components in 18 gauge zinc-coated galvanized steel frame and panels with weather resistant, baked enamel finish. Units surface shall be tested 500 hours in salt spray test.
- B. Mount controls in weatherproof panel provided with removable panels and/or access doors with quick opening fasteners.

2.04 CONDENSER COILS

- A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide subcooling circuit(s). Factory leak test under water to 450 psig, and vacuum dehydrate. Seal with holding charge of nitrogen.

2.05 FANS AND MOTORS

- A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Fans shall be statically and dynamically balanced.
- B. Weatherproof motors suitable for outdoor use, with permanently lubricated totally enclosed or open construction motors shall be provided and shall have built in current and thermal overload protection. Motors shall be either sleeve or ball bearing type.

2.06 COMPRESSORS

- A. Compressors: direct drive scroll compressors with integral centrifugal oil pump. Provide suction gas cooled motor with winding temperature limits and compressor overloads. Provide external high and low pressure cutout devices.

2.07 CONTROLS

- A. Provide factory-wired condensing units with 24 volt control circuit with internal fusing and control transformers, contactor pressure lugs and/or terminal block for power wiring. Contractor to provide field installed unit mounted disconnect switch. Units shall have single point power connections.

2.08 STAGING CONTROLS

- A. Provide NEC Class II, electronic, adjustable zone control to maintain zone temperature setting.
- B. Provide 24 volt, adjustable thermostat to control heating and cooling stages in sequence with delay between stages, and supply fan to maintain temperature setting.
 - 1. Locate thermostat in room as shown on plans.

2.09 BUILDING MANAGEMENT SYSTEM

- A. Interface control module to Energy Management System to be furnished and mounted by unit manufacturer. Through this interface module, all Energy Management functions (specified in Energy Management Section) shall be performed. See Building Automation and Automatic Temperature Control System Specifications. The interface module with necessary controls and sensors shall all be factory mounted (not field mounted). If not furnished by unit manufacturer, this shall be furnished by Energy Management System Contractor for factory mounting by rooftop unit manufacturer in rooftop unit and rated for service up to 140 F. The only field connection to Energy Management System shall be a single communication link.
- B. Control Functions: Include unit scheduling, occupied/unoccupied mode, start-up and coast-down modes, demand limiting, night setback, timed override and alarm shutdown.
- C. Diagnostic Functions: Include supply fan status, , and a field supplied and installed sensor, to provide a dirty filter alarm.
- D. Provide capabilities for Boolean Processing and trend logs as well as "templated" reports and logs.

2.10 MISCELLANEOUS FEATURES

- A. Neoprene Isolators: Provide field-installed rubber-in-shear isolators.
- B. Low Ambient Control: Electronic head pressure control that allows operation to 0 degrees F outdoor ambient.
- C. Condenser Coil guard: Metal grille with Polyvinyl chloride coating to cover condenser coil area.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Where required by Code and/or as indicated on drawings and/or schedules:
 - 1. Install units on vibration isolation.
 - 2. Provide seismic / shear restrained mounts as indicated.
- B. Install units on concrete pad, roof rails, or dunnage as indicated on drawings and/or schedules.
- C. Install in accordance with manufacturer's instructions.
- D. Provide connection to refrigeration piping system and evaporators
- E. Prepare for connection to electrical service. Coordinate all required electrical connections with electrical contractor.
- F. Provide connection to control wiring and controls integration as specified by contract.

END OF SECTION

PART 1 - GENERAL

1.01 SYSTEM DESCRIPTION

- A. The Air Conditioner or heat pump system shall be a Mitsubishi Electric split system with Variable Speed Inverter Compressor technology. The system shall consist of a horizontal discharge, single phase outdoor unit, a matched capacity indoor section that shall be equipped with a wired wall mounted, and/or wireless wall mounted controller.

1.02 QUALITY ASSURANCE

- A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.
- B. All wiring shall be in accordance with the National Electrical Code (N.E.C.).
- C. The units shall be rated in accordance with Air-conditioning Refrigeration Institute's (ARI) Standard 210 and bear the ARI Certification label.
- D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001.
- E. A dry air holding charge shall be provided in the indoor section.
- F. A pressure charge of R410A refrigerant sufficient for up to twenty-five (25) feet of refrigerant tubing shall be provided in the outdoor condensing unit.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Unit shall be stored and handled according to the manufacturer's recommendations.
- B. The wireless controller shall be shipped inside the carton with the indoor unit able to withstand 105 degree F storage temperatures and 95% relative humidity without adverse effect.

1.04 WARRANTY

- A. The units shall have a manufacturer's parts and defects warranty for a period five (5) year from date of installation. The compressor shall have a warranty of seven (7) years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.
- B. Manufacturer shall have over 30 years of continuous experience in the U.S. market.

1.05 SUBMITTALS

- A. Submit manufacturer's product data including capacity of unit, electrical requirements, airflow, sound pressure data, indoor and outdoor unit measurements, weight, control schematics, and wiring diagrams.

PART 2 - PRODUCTS

2.01 RECESSED CEILING CASSETTE

- A. General
 - 1. The indoor unit shall be a space-saving ceiling-recessed cassette type, factory assembled, wired and tested. Contained within the unit shall be all factory wiring and internal piping,

drain left mechanism, control circuit board, fan, and fan motor. The unit, in conjunction with the remote controller, shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch.

B. Unit Cabinet

1. The cabinet shall be formed from galvanized sheet metal coated with high-density foam insulation. Cabinet shall be for recessed mounting and provided with four (4) corner mounting supports behind removable corner pockets in Grille assembly allowing adjustment of mounting height from front of unit.
2. A separate grill assembly shall be attached to the front of the cabinet to provide supply air vanes in four directions and a center mounted return air section. The four-way grill shall be fixed to bottom of cabinet allowing two, three or four-way blow. The grill vane angles shall be individually adjustable from the wired remote controller to customize the airflow pattern for the conditioned space. Grill assembly color shall be white.

C. Fan

1. The indoor fan shall be an assembly with a turbo fan propeller, direct driven by a single motor and shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings. The indoor fan shall consist of four (4) speed settings. The fan shall have a selectable Auto fan setting that will adjust the fan speed based on the difference between controller set-point and space temperature.

D. Vane

1. The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow with switches that can be set to provide optimum airflow based on ceiling height and number of outlets used. The indoor unit vanes shall have 5 fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.

E. Filter

1. Return air shall be filtered by means of a removable washable filter.

F. Coil

1. The indoor unit coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing.
2. The coils shall be pressure tested at the factory.
3. A condensate pan with drain connections shall be provided under the coil. The unit shall also include a built-in, automatic condensate lift mechanism that will be able to raise drain water above the condensate pan. The lift mechanism shall be equipped with a positive acting liquid level sensor to shut down the indoor unit if liquid level in the drain pan reached maximum level.
4. Both refrigerant lines between the indoor unit and outdoor unit shall be fully insulated.

2.02 OUTDOOR UNIT

A. General

1. The outdoor unit shall be compatible with the associated indoor unit. The connected indoor unit shall be of the same capacity as the outdoor unit.
2. The outdoor unit shall be equipped with an electronic control board that interfaces with the indoor unit to perform all necessary operation functions.
3. The outdoor unit shall be capable of cooling operation down to 0°F ambient temperature without additional low ambient controls. A wind baffle shall be provided with the unit.
4. The outdoor unit shall be completely factory assembled, piped, wired, and tested.

B. Cabinet

1. The casing shall be constructed from galvanized steel plate, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection.
 2. Mounting feet shall be provided and shall be welded to the base of the cabinet and be of sufficient size to afford reliable equipment mount and stability.
 3. Easy access shall be afforded to all serviceable parts by means of removable panel sections.
 4. The fan grill shall be of ABS plastic.
- C. Fan
1. Unit shall be furnished with a DC fan motor.
 2. The fan motor bearings shall be permanently lubricated.
 3. The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across it from the rear and dispelling it through the front. The fan shall be provided with a raised guard to prevent external contact with moving parts.
- D. Coil
1. The condenser coil shall be of copper tubing with aluminum fins. The coil shall be protected with an integral metal guard.
 2. Refrigerant flow from the condenser shall be controlled by means of an electronic linear expansion valve (LEV) metering device. The LEV shall be control by a microprocessor controlled step motor.
 3. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1" thick insulation shall have a Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E84 and CAN / ULC S-102.
- E. Compressor
1. The compressor for wall mounted units shall be a Frame Compliant Scroll compressor with Variable Speed Inverter Drive Technology. The compressor recessed units shall be a DC twin-rotor rotary compressor with Variable Speed Inverter Drive Technology.
 2. The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which shall result in significant energy savings.
 3. To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be automatically, intermittently applied to the compressor motor windings to maintain sufficient heat to vaporize any refrigerant. No crankcase heater is to be used.
 4. The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.

PART 3 - EXECUTION

3.01 GENERAL

- A. Install all equipment, piping, and controls in accordance with manufacturer's installation instructions.
- B. Install refrigerant piping as per manufacturer's instructions and specification.
- C. Mount the outdoor condensing unit on a concrete equipment pad.

- D. Support the indoor unit as per the manufacturer's instructions.
- E. Mount the controller. Coordinate exact location with the owner.
- F. Install the drain line. Pitch drain line in the direction of flow.
- G. Install new filter on indoor unit.
- H. Clean all equipment after installation.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.
- B. Provide interlock wiring between electrically-operated terminal units; and between terminal units and field-installed control devices.
- C. Interlock wiring specified, as factory-installed is work of this section.
- D. Provide the following electrical work as work of this section:
 - 1. Control wiring between field-installed controls, indicating devices, and terminal unit control panels.
 - 2. Control wiring specified, as work of Division 23 for HVAC controls is work of that section.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of terminal units, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Units shall be tested and certified in accordance with ARI Standard 840.
- C. Unit insulation and adhesive shall meet the requirements for flame spread rating of lower than 25 per ASTM E84 and smoke generation rating of lower than 50 per ASTM E84. Only closed cell insulation shall be used. The use of fiberglass insulation is not acceptable.
- D. Each coil shall be factory tested for leakage at 350 psig air pressure with coil submerged in water.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications for terminal units showing dimensions, capacities, ratings, performance characteristics, gages and finishes of materials, and installation instructions.
- B. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, construction details, and field connection details.
- C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to terminal units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- D. Samples: Submit 3 samples of each type of cabinet finish and color furnished.
- E. Maintenance Data: Submit maintenance instructions, including lubrication instructions, filter replacement, motor and drive replacement, and spare parts lists. Include this data, product

data, and shop drawings in maintenance manuals; in accordance with requirements of Division 01.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Handle terminal units and components carefully to prevent damage, breaking, denting and scoring. Do not install damaged terminal units or components; replace with new.
- B. Store terminal units and components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.
- C. Comply with Manufacturer's rigging and installation instructions for unloading terminal units, and moving them to final location.

PART 2 - PRODUCTS

2.01 UNIT VENTILATORS

- A. General: Provide unit ventilators having cabinet sizes, and in locations indicated, and of capacities, style, and having accessories as scheduled. Unit ventilators shall be designed for floor (vertical) mounting. Units shall incorporate hot water heat as specified. Include in basic unit cabinets, dampers, fan board assembly, motors, and coils. The unit shall be a factory-assembled bolt-together unit ventilator. Contained within the unit enclosure shall be a factory-installed motor, wiring, blowers, coil(s), bearing, and outdoor/return air dampers. Units shall be of draw-thru design. Blow-thru design is not acceptable.
- B. Unit Construction:
 - 1. Unit frame shall be constructed of heavy gage galvanized steel components that form a rigid foundation and resist corrosion.
 - 2. Unit shall be 21 7/8 inches deep and include a false back to allow alignment of unit outside air passage with existing outside air louver connection.
 - 3. Unit composed of three main sub-assembled modules: Blower Module, Coil Module and Damper Module. Modules shall be removable without disassembling the unit.
 - 4. Modules shall be externally insulated using closed cell insulation.
 - 5. Unit back shall be insulated using closed cell insulation.
 - 6. Exterior access panels shall be constructed of heavy gage galvanized steel that has been cleaned and pretreated before painting to maximize corrosion resistance. Exterior service access panels shall be retained by tamper-resistant fasteners. Panels shall be electrostatically coated with polyester powder baked on textured paint.
- C. Vertical Unit:
 - 1. Cabinet shall be provided with three 16-gauge exposed front panels, service access panels with tamper-resistant hex socket head threaded fasteners and retainer chains for safety and ease of service.
 - 2. Cabinet models shall have standard textured baked powder finished panels. Cabinet tops shall be charcoal bronze with a steel bar-stock discharge grille. Cabinet top shall have textured charcoal finish.
 - 3. External access panels shall be easily removed from outside of the unit for easy access to filters and routine maintenance. Unit top shall be easily removed for routine maintenance.
 - 4. Unit shall include leveling legs to compensate for floor irregularities.
- D. Coils:
 - 1. Hot water coils shall be constructed of mechanically expanded copper tubing minimum wall .016" inside, aluminum fins, minimum thickness .025". The fin surface shall be enhanced to the maximum degree by incorporating a raised lance design. Coils shall be pressure tested at no less than 350 psig at the factory to ensure they are leak tight. Hot

water coils shall be constructed of mechanically expanded copper tubing minimum wall .016", inside aluminum fins minimum thickness .045". The coil performance shall be maximized by incorporation of a waffle design of the fin surface. Coils shall be pressure tested at no less than 350 psig at the factory to ensure they are leak tight. A coil low limit shall be factory mounted on the leaving side of the heating coil. If the capillary device senses a temperature less than 38°F along any 6" the device will actuate, device shall be SPDT, auto reset.

E. Pipe Tunnel:

1. Units rated 500 to 1500 CFM vertical units shall have an integral pipe tunnel that can be used for piping across the unit. This tunnel shall be insulated, with closed cell insulation, from the unit and accessible from each end compartments to allow maximum flexibility of crossover piping installation.

F. Drain Pans:

1. Unit drain pan shall be double sloped welded galvanized steel to prevent standing water.
2. Drain pan will be coated to prevent external condensation during cooling.
3. Drain connections (7/8 inch OD) shall be supplied on both ends of pan for field conversion of slope and drain hand connection if required.
4. Drain pan slope shall be field convertible without removing the coil module.
5. Heating only units shall come equipped with a double sloped drain pan for future cooling needs.

G. Fan and Motor:

1. Fan and motor assembly shall be direct driven. One end of drive shaft shall be mounted in a sleeve-type or ball bearing, with other end of shaft supported by motor bearings.
2. Fan wheels shall be double-width, double-inlet with forward-curved blades, and shall operate at low speed. Fan wheels shall be mounted on a hollow one piece steel shaft.
3. Fan wheels shall be statically and dynamically balanced.
4. Fan (blower) housings shall be constructed from heavy-gage steel and mounted to a heavy-gage galvanized steel fan deck.
5. To prevent vibration transmission to the unit frame, motor and shaft bearing shall be resiliently mounted. The drive shaft shall be connected to motor with a flexible coupling.
6. Fan motors shall be mounted outside of the airstream on a heavy-gage steel partition and removable without removing the blower module.
7. Units shall be supplied with permanently split capacitor (PSC) multi-tap transformer motors. All motors shall have integral high temperature reset and shall be protected with cartridge-type fuse(s).

H. Filters:

1. Unit shall be supplied with 1-inch throwaway filter. The unit shall be capable of incorporating a 2 inch filter. For even loading, filter shall be positioned to filter mixed outdoor and return air.
2. Filter track shall be field adjustable to accept 1-inch or 2-inch permanent or renewable media replacement filters.

I. Dampers:

1. Unit shall contain a single outdoor-air/return-air damper with multiple sealing points. Damper shall be constructed of extruded aluminum with external closed cell insulation. The damper assembly shall include an anti-draft plate to prohibit outdoor air from penetrating the classrooms through the damper assembly.
2. As scheduled: Unit shall contain a single (heating coil and/or cooling coil) face/bypass control damper for full modulation of heating and cooling supply air control.

J. Accessories:

1. Exterior wall louver

- K. Manufacturer: Subject to compliance with requirements. Provide unit ventilators of one of the following:
 - 1. Daikin
 - 2. Carrier
 - 3. MagicAire
 - 4. Approved Equal
- L. Provide finished side panels and matching filler sections by the same manufacturer, where new unit ventilators are smaller than the existing unit ventilators being replaced, or where the unit ventilator is larger than the existing and no new cabinetry is specified. No unfinished wall surfaces shall be exposed after installation.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which terminal units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF UNIT VENTILATORS

- A. General: Install unit ventilators as indicated, and in accordance with manufacturer's installation instructions.
- B. Locate unit ventilators as indicated, level and shim units, anchor to substrate.
- C. Provide all blocking, weather striping, insulation boards, fire rated marine grade plywood, etc. To provide a level, plumb and air and weather tight seal of unit ventilators to existing exterior wall / outside air louver.
- D. Adjust and level unit ventilators to within $\pm 1/8$ " of adjacent cabinetry surfaces. Bring to the attention of the construction manager any conditions which prevent the ability to meet this requirement as soon as they are found.
- E. Install piping as indicated.
- F. Protect units with protective covers during balance of construction.
- G. Coordinate all demolition or modification of existing equipment and adjacent cabinetry with the Owner prior to the start of any work.
- H. In no case shall there be any exposed sharp corners or edges which can lead to cuts or abrasions by the nominal activity of the occupants.

3.03 ELECTRICAL WIRING

- A. General: Install electrical devices furnished by manufacturer not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram.
- B. Verify that electrical wiring installation is in accordance with manufacturer's submittal. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.04 ADJUSTMENT AND CLEANING

- A. General: After construction is completed, including painting, clean unit exposed surfaces, vacuum clean terminal coils and inside of cabinets.
- B. Retouch any marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer. Provide extra touch up paint to owner.
- C. Install new filter units for terminals requiring the same.
- D. Test, adjusting, and balancing is specified in other Division 23 sections; not work of this section.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 232000: Pipe, Valves, and Fittings.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's catalog sheets, brochures, performance charts, standard finish chart, specifications and installation instructions for each item specified.
 - 2. Schedule: Itemize pipe or tube size and material, fin size and material, fin thickness, fin spacing per linear foot, actual finned length of each element, number of rows of element and rating in Btuh per linear foot of finned element (single or double row) and location of installation (room or space number).

1.03 PRODUCT DELIVERY

- A. Deliver equipment in original shipping containers, properly labeled as to type, size and finish.

1.04 MAINTENANCE

- A. Special Tools: One tool for each type and size vandal resistant fastener.

PART 2 - PRODUCTS

2.01 APPROVE MANUFACTURERS:

- A. Slant/Fin
- B. Stelpro
- C. Qmark

2.02 HOT WATER CONVECTORS

- A. Cover Assembly
 - 1. Furnish and install 350 Series model 351-14 baseboard cover assembly as manufactured by Slant/Fin Corp., consisting of one-piece, back and top panel, and one-piece front panel, formed of cold rolled steel. Bottom and top edges of back panel shall be formed to provide channels along entire length, to receive full-height support brackets. Brackets shall be die-formed of electro galvanized cold rolled steel, for rigid bracing and spring locking. Slide-action expansion cradles, formed of polypropylene, shall be inserted between heating element and support bracket. Cradles shall protect element bottom and sides from contact with brackets or cover, confining element to free lateral expansion for noiseless operation. All cover components with a 19-gauge front cover shall be painted in Nu-White thermosetting polyester enamel and all cover components with a 16-gauge front cover shall have a galvanized finish.
- B. Heating Element
 - 1. Furnish and install baseboard Slant/Fin heating element consisting of 3/4 inch nominal copper tubing, with 3 inches x 3-1/4 inches x .024 inch aluminum fins, spaced 48 per linear foot. The tubing shall not be weakened by expansion in process of manufacture, but shall be forced through undersized fin holes to obtain a force-fit mechanical bond. A flange with four teeth shall be formed on each fin to increase thermal contact and to space and lock

the fins uniformly in place. One end of each element tube shall be expanded to receive the unexpanded end of another, without couplings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install the Work of this Section in accordance with the manufacturer's printed instructions unless otherwise shown or specified.
- B. Secure convector radiator enclosures to masonry wall construction with expansion shields and bolts, of size in number and on centers as recommended by the manufacturer.
- C. Install convector with air vents, isolation valves, and a balancing valve.
- D. Install access panels for each control, shutoff, and balancing valve installed in enclosure.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Electric Unit Heaters.
- B. Electric Cabinet Unit Heaters.
- C. Electric Ceiling Heaters.
- D. Electric Wall Heaters.
- E. Electric Baseboard.
- F. Electric Duct Heaters.

1.02 REFERENCES

- A. Electric unit heaters shall meet the requirements of the National Electric Code (NEC) and shall be UL listed.

1.03 SUBMITTALS

- A. Submit under provisions of Section 013300 - SUBMITTALS.
- B. Submit manufacturer's product data and installation instructions to Engineer.
- C. Submittal data shall include capacity and size of each heater and wiring instructions.

PART 2 - PRODUCTS

2.01 ELECTRIC CABINET UNIT HEATERS

- A. Cabinet units heaters shall be Model CU900 as manufactured by QMark or approved equal. The heaters shall be UL listed for mounting in any position, including on-end, fully recessed, semi-recessed or surface mounted. Refer to equipment schedule for mounting type.
- B. Cabinet: The cabinet shall be of heavy duty 16 gauge cold rolled steel. The heater front covers shall be securely attached to the cabinet with a maximum of two slotted head style spring latches and easily removable for access to elements, filters and control panel.
- C. Heating Element: The heating elements shall be warranted for five years and shall be of non-glowing design consisting of 80/20 NiCh resistance wire enclosed in a steel sheath to which steel plate fins are brazed. The heating element shall be located directly in front of the blower discharge air for uniform heating.
- D. Safety Thermal Cutouts: Thermal safety cutouts shall be built into the system to automatically shut off heater in event of overheating due to any cause. The safety cutouts shall directly interrupt power to the elements and not depend on relays to interrupt the power.
- E. Motor and Blower Assembly: The motor and blower shall be direct drive and resiliently mounted on a rigid heavy gauge frame for quiet operation. The motor shall be two speed with automatic reset overload protection. The motor shall be vented and mounted in the air stream to provide maximum cooling of the motor. Motor fuse protection shall be provided to UL and NEC requirements. The blower shall be forward curved, double inlet, centrifugal type with discharge directly on the full length of the elements to provide uniform discharge air temperatures.

- F. Air Filters: The filter shall be located ahead of the motor and blower assembly to assure clean air circulation. The filter shall filter the returning room air. Filter shall be easily removed for changing or cleaning by removing the front panel and pulling on the filter.
- G. Front Cover Interlock: Heater shall be provided with an electrical interlock to shut down the heater when the front cover is opened to provide safety to the maintenance personnel during filter cleaning or other maintenance.
- H. Fan Delay Control: Fan control shall delay fan start up of the fan motor until the heating elements have warmed up. It shall maintain motor operation air heating elements have been de-energized to dissipate residual heat.
- I. Temperature Control: Thermostat shall be built in, snap action with remote bulb sensor located in the return air stream.
- J. Provide other accessories as described on the contract drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install unit in accordance with manufacturer's published installation instructions.
- B. Do not install horizontal unit heaters closer than 12 inches to combustible materials in any direction.
- C. Do not install vertical unit heaters closer than 18 inches from ceiling and 24 inches horizontally from combustible materials in any direction. The bottom of the unit must be a minimum of 8 feet above the floor.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- C. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner before partially or completely disabling system.
 - 2. Notify local fire service.
 - 3. Make notifications at least 24 hours in advance.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

- F. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- H. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Wire pulling lubricant.
- G. Cable ties.
- H. Firestop sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 260505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- C. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 284600 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2020.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- H. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable; 2018.

- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- K. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- M. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- N. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- O. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- P. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.

- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- E. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- F. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- G. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
 - 2. Control Circuits: 14 AWG.
- H. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- I. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 - 3. Color Code:
 - a. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - b. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 - 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com/#sle.
 - b. General Cable Technologies Corporation; _____: www.generalcable.com/#sle.
 - c. Southwire Company: www.southwire.com/#sle.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.

- b. Size 8 AWG and Larger: Stranded.
- 2. Control Circuits: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.

2.04 METAL-CLAD CABLE

- A. Manufacturers:
 - 1. AFC Cable Systems Inc: www.afcweb.com/#sle.
 - 2. Encore Wire Corporation: www.encorewire.com/#sle.
 - 3. Southwire Company: www.southwire.com/#sle.
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- F. Provide dedicated neutral conductor for each phase conductor where indicated or required.
- G. Grounding: Full-size integral equipment grounding conductor.
- H. Armor: Steel, interlocked tape.

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 260526.
- C. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

- F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
 - 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. Ideal Industries, Inc: www.idealindustries.com/#sle.
 - c. NSI Industries LLC: www.nsiindustries.com/#sle.
- G. Mechanical Connectors: Provide bolted type or set-screw type.
 - 1. Manufacturers:
 - a. Burndy LLC; _____: www.burndy.com/#sle.
 - b. Thomas & Betts Corporation: www.tnb.com/#sle.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.06 ACCESSORIES

- A. Electrical Tape:
 - 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 - 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 - 4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.
 - 5. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil (0.18 mm); suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 - 6. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
 - 1. Manufacturers:
 - a. 3M: www.3m.com/#sle.
 - b. American Polywater Corporation: www.polywater.com/#sle.
 - c. Ideal Industries, Inc: www.idealindustries.com/#sle.
- D. Cable Ties: Material and tensile strength rating suitable for application.
 - 1. Manufacturers:
 - a. Burndy LLC; _____: www.burndy.com/#sle.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that work likely to damage wire and cable has been completed.
- B. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- C. Verify that field measurements are as indicated.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. When circuit destination is indicated without specific routing, determine exact routing required.
 - 2. Arrange circuiting to minimize splices.
 - 3. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location indicated.
 - 4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 5. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install metal-clad cable (Type MC) in accordance with NECA 120.
- E. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- H. Terminate cables using suitable fittings.

1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- I. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 3. Do not remove conductor strands to facilitate insertion into connector.
 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- P. Identify conductors and cables in accordance with Section 260553.
- Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Bonding and Equipment Grounding:
 - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical

- conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Make grounding and bonding connections using specified connectors.
 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

- D. Identify grounding and bonding system components in accordance with Section 260553.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.
 - 2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

7. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
 3. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation; _____: www.cooperindustries.com/#sle.
 - b. Erico International Corporation; _____: www.erico.com/#sle.
 - c. O-Z/Gedney, a brand of Emerson Electric Co; _____: www.emerson.com/#sle.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch (13 mm) diameter.
 - b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch (6 mm) diameter.
 - c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch (10 mm) diameter.
 - d. Outlet Boxes: 1/4 inch (6 mm) diameter.
 - e. Luminaires: 1/4 inch (6 mm) diameter.
- F. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 4. Hollow Masonry: Use toggle bolts.
 5. Hollow Stud Walls: Use toggle bolts.
 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 7. Sheet Metal: Use sheet metal screws.
 8. Wood: Use wood screws.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Flexible metal conduit (FMC).
- C. Liquidtight flexible metal conduit (LFMC).
- D. Electrical metallic tubing (EMT).
- E. Conduit fittings.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 260529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- H. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- I. UL 360 - Liquid-Tight Flexible Metal Conduit; Current Edition, Including All Revisions.
- J. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- K. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
- D. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
- E. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- F. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).
- G. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
- H. Exposed, Exterior: Use galvanized steel rigid metal conduit.
- I. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
- J. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
 - 4. Vibrating equipment includes, but is not limited to:
 - a. Motors.
- K. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Fittings for Grounding and Bonding: Also comply with Section 260526.
- C. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
 - 3. Control Circuits: 1/2 inch (16 mm) trade size.
- F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 - 2. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 - 3. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc; _____: www.afcweb.com/#sle.
 - 2. Electri-Flex Company; _____: www.electriflex.com/#sle.
 - 3. International Metal Hose; _____: www.metalhose.com/#sle.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.

2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc; _____: www.afcweb.com/#sle.
 - 2. Electri-Flex Company; _____: www.electriflex.com/#sle.
 - 3. International Metal Hose; _____: www.metalhose.com/#sle.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.

- c. Thomas & Betts Corporation: www.tnb.com/#sle.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

2.06 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
 2. Western Tube, a division of Zekelman Industries: www.westerntube.com/#sle.
 3. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 - a. Do not use die cast zinc fittings.
 4. Connectors and Couplings: Use compression (gland) or set-screw type.
 5. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Conduit Routing:
 1. When conduit destination is indicated without specific routing, determine exact routing required.
 2. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 3. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.

- c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 - 4. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 5. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 - 6. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
 - 7. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
 - 8. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
- E. Conduit Support:
- 1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 - 4. Use conduit strap to support single surface-mounted conduit.
 - 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 - 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 - 7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
- F. Connections and Terminations:
- 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 - 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- G. Penetrations:
- 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 - 4. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 - 5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 - 6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are

- necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
7. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- H. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where conduits are subject to earth movement by settlement or frost.
- I. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
 - a. Where conduits enter building from outside.
 - b. Where service conduits enter building from underground distribution system.
 - c. Where conduits enter building from underground.
 - d. Where conduits may transport moisture to contact live parts.
 2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- J. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- K. Provide grounding and bonding in accordance with Section 260526.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

1.02 RELATED REQUIREMENTS

- A. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- D. Section 262726 - Wiring Devices:
 - 1. Wall plates.
 - 2. Additional requirements for locating boxes for wiring devices.
- E. Section 271000 - Structured Cabling: Additional requirements for communications systems outlet boxes.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 262726.
 13. Manufacturers:
 - a. Hubbell Incorporated; Bell Products; _____: www.hubbell-rtb.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co; _____: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation; _____: www.tnb.com/#sle.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:

- a. Indoor Clean, Dry Locations: Type 1, painted steel.
- b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Locations:
 1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
 2. Locate boxes as required for devices installed under other sections or by others.
 - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
 - b. Communications Systems Outlets: Comply with Section 271000.
 - c. _____.
 3. Locate boxes so that wall plates do not span different building finishes.
 4. Locate boxes so that wall plates do not cross masonry joints.
 5. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
 7. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 8. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
- E. Box Supports:
 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

- F. Install boxes plumb and level.
- G. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- H. Install boxes as required to preserve insulation integrity.
- I. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- J. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- K. Close unused box openings.
- L. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- M. Provide grounding and bonding in accordance with Section 260526.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Surface raceway systems.

1.02 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.
- C. UL 5A - Nonmetallic Surface Raceways and Fittings; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS**2.01 RACEWAY REQUIREMENTS**

- A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

- A. Manufacturers:
 - 1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
 - 2. MonoSystems, Inc; _____: www.monosystems.com/#sle.
 - 3. Wiremold, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.
- B. Surface Metal Raceways: Listed and labeled as complying with UL 5.
- C. Surface Nonmetallic Raceways: Listed and labeled as complying with UL 5A.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- B. Section 260573 - Power System Studies: Arc flash hazard warning labels.

1.03 REFERENCE STANDARDS

- A. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - b. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - 2. Arc Flash Hazard Warning Labels: Comply with Section 260573.
- C. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or

branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Manufacturers:
 - a. Brimar Industries, Inc: www.brimar.com/#sle.
 - b. Kolbi Pipe Marker Co; _____: www.kolbipipemarkers.com/#sle.
 - c. Seton Identification Products; _____: www.seton.com/#sle.
2. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
4. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Manufacturers:
 - a. Brady Corporation; _____: www.bradyid.com/#sle.
 - b. Brother International Corporation: www.brother-usa.com/#sle.
 - c. Panduit Corp: www.panduit.com/#sle.
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:
 - a. System designation where applicable:
 - 1) Emergency Power System: Identify with text "EMERGENCY".
 - 2) Fire Alarm System: Identify with text "FIRE ALARM".
 - b. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
 - a. System Designation: 1 inch (25 mm).
 - b. Equipment Designation: 1/2 inch (13 mm).
 - c. Other Information: 1/4 inch (6 mm).
5. Color:
 - a. Normal Power System: White text on black background.

2.03 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:

1. Materials:
2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Branch Devices: Adjacent to device.
 6. Interior Components: Legible from the point of access.
 7. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 260574 - ARC FLASH HAZARD ANALYSIS AND SHORT CIRCUIT COORDINATION STUDY
H2M

PART 1 - GENERAL

1.01 SCOPE

- A. The contractor shall furnish short-circuit and protective device coordination studies as prepared by the equipment manufacturer being furnished on the project. **Third Party Studies Shall Not Be Acceptable.**
- B. The contractor shall furnish an Arc Flash Hazard Analysis Study per the requirements set forth in the current version of NFPA 70E - Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE Standard 1584-2002, the IEEE Guide for Performing Arc-Flash Calculations.
- C. The scope of the studies shall include new distribution equipment supplied under this contract.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract.

1.03 REFERENCES

- A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. IEEE 141 - Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
 - 2. IEEE 242 -Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
 - 3. IEEE 399 - Recommended Practice for Industrial and Commercial Power System Analysis
 - 4. IEEE 241 -Recommended Practice for Electric Power Systems in Commercial Buildings
 - 5. IEEE 1015 - Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.
 - 6. IEEE 1584 -Guide for Performing Arc-Flash Hazard Calculations
- B. American National Standards Institute (ANSI):
 - 1. ANSI C57.12.00- Standard General Requirements for Liquid-Immersed Distribution, Power, and .Regulating Transformers
 - 2. ANSI C37.13- Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
 - 3. ANSI C37.010- Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
 - 4. ANSI C 37.41- Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.
- C. The National Fire Protection Association (NFPA)
 - 1. NFPA 70 -National Electrical Code, latest edition
 - 2. NFPA 70E- Standard for Electrical Safety in the Workplace

1.04 SUBMITTALS FOR REVIEW/APPROVAL

- A. The studies shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the study may cause delays in equipment shipments, approval from the Engineer may be obtained for a preliminary submittal of data to ensure that the selection of device ratings and characteristics will be satisfactory to properly select the distribution equipment. The formal study will be provided to verify preliminary findings.

1.05 SUBMITTALS FOR CONSTRUCTION

- A. The results of the short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. A minimum of five (5) bound copies of the complete final report shall be submitted. For large system studies, submittals requiring more than five (5) copies of the report will be provided without the section containing the computer printout of the short- circuit input and output data. Electronic PDF copies of the report shall be provided upon request.
- B. The report shall include the following sections:
 - 1. Executive Summary including Introduction, Scope of Work and Results/Recommendations.
 - 2. Short-Circuit Methodology Analysis Results and Recommendations
 - 3. Short-Circuit Device Evaluation Table
 - 4. Protective Device Coordination Methodology Analysis Results and Recommendations
 - 5. Protective Device Settings Table
 - 6. Time-Current Coordination Graphs and Recommendations
 - 7. Arc Flash Hazard Methodology Analysis Results and Recommendations including the details of the incident energy and flash protection boundary calculations, along with Arc Flash boundary distances, working distances, Incident Energy levels and Personal Protection Equipment levels.
 - 8. Arc Flash Labeling section showing types of labels to be provided. Section will contain descriptive information as well as typical label images.
 - 9. One-line system diagram that shall be computer generated and will clearly identify individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location, device numbers used in the time-current coordination analysis, and other information pertinent to the computer analysis.

1.06 QUALIFICATIONS

- A. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the responsible charge and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.
- B. The Registered Professional Electrical Engineer shall be an employee of the equipment manufacturer or an approved engineering firm.
- C. The Registered Professional Electrical Engineer shall have a minimum of five (5) years of experience in performing power system studies.
- D. The approved engineering firm shall demonstrate experience with Arc Flash Hazard Analysis by submitting names of at least ten actual arc flash hazard analyses it has performed in the past year.
- E. The engineering firm shall have a minimum of twenty-five (25) years of experience in performing power system studies.

1.07 COMPUTER ANALYSIS SOFTWARE

- A. The studies shall be performed using SKM Systems Analysis Power*Tools for Windows (PTW) software program.

SECTION 260574 - ARC FLASH HAZARD ANALYSIS AND SHORT CIRCUIT COORDINATION STUDY
H2M

PART 2 - PRODUCT

2.01 STUDIES

- A. The contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E -Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D. This study shall also include short-circuit and protective device coordination studies. All studies to be prepared by Square D Engineering Services.

2.02 DATA

- A. Contractor shall furnish all data as required for the power system studies. The Engineer performing the short circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.
- B. Source combination may include present and future motors and generators.
- C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner, or Contractor.
- D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.03 SHORT-CIRCUIT ANALYSIS

- A. Transformer design impedances shall be used when test impedances are not available.
- B. Provide the following:
 - 1. Calculation methods and assumptions
 - 2. Selected base per unit quantities
 - 3. One-line diagram of the system being evaluated that clearly identifies individual equipment buses, bus numbers used in the short-circuit analysis, cable and bus connections between the equipment, calculated maximum short-circuit current at each bus location and other information pertinent to the computer analysis
 - 4. The study shall include input circuit data including electric utility system characteristics, source impedance data, conductor lengths, number of conductors per phase, conductor impedance values, insulation types, transformer impedances and X/R ratios, motor contributions, and other circuit information as related to the short-circuit calculations.
 - 5. Tabulations of calculated quantities including short-circuit currents, X/R ratios, equipment short-circuit interrupting or withstand current ratings and notes regarding adequacy or inadequacy of the equipment rating.
 - 6. Results, conclusions, and recommendations. A comprehensive discussion section evaluating the adequacy or inadequacy of the equipment must be provided and include recommendations as appropriate for improvements to the system.
- C. For solidly-grounded systems, provide a bolted line-to-ground fault current study for applicable buses as determined by the engineer performing the study.
- D. Protective Device Evaluation:
 - 1. Evaluate equipment and protective devices and compare to short circuit ratings
 - 2. Adequacy of switchgear, motor control centers, and panelboard bus bars to withstand short circuit stresses

SECTION 260574 - ARC FLASH HAZARD ANALYSIS AND SHORT CIRCUIT COORDINATION STUDY
H2M

3. Square D shall notify Owner in writing, of any circuit protective devices improperly rated for the calculated available fault current.

2.04 ARC FLASH HAZARD ANALYSIS

- A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2009, Annex D. The arc flash hazard analysis shall be performed in conjunction with the short-circuit analysis (Section 2.03) and the protective device time-current coordination analysis (Section 2.04)
- B. The flash protection boundary and the incident energy shall be calculated at significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and splitters) where work could be performed on energized parts.
- C. Working distances shall be based on IEEE 1584. The calculated arc flash protection boundary shall be determined using those working distances.
- D. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations
- E. The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location in a single table. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum. Conversely, the maximum calculation will assume a maximum contribution from the utility. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable as well as any stand-by generator applications.
 1. The Arc-Flash Hazard Analysis shall be performed utilizing mutually agreed upon facility operational conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.
- F. For each piece of ANSI rated equipment with an enclosed main device, two calculations shall be made. A calculation shall be made for the main cubicle, sides, or rear; and shall be based on a device located upstream of the equipment to clear the arcing fault. A second calculation shall be made for the front cubicles and shall be based on the equipment's main device to clear the arcing fault. For all other non-ANSI rated equipment, only one calculation shall be required and it shall be based on a device located upstream of the equipment to clear the arcing fault.
- G. When performing incident energy calculations on the line side of a main breaker (as required per above), the line side and load side contributions must be included in the fault calculation.
- H. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. A maximum clearing time of 2 seconds will be used based on IEEE 1584-2002 section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.
- I. Provide the following:
 1. Results of the Arc-Flash Hazard Analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, working distances, personal-protective equipment classes and AFIE (Arc Flash Incident Energy) levels.

SECTION 260574 - ARC FLASH HAZARD ANALYSIS AND SHORT CIRCUIT COORDINATION STUDY
H2M

2. The Arc-Flash Hazard Analysis shall report incident energy values based on recommended device settings for equipment within the scope of the study.
3. The Arc-Flash Hazard Analysis may include recommendations to reduce AFIE levels and enhance worker safety.

PART 3 - EXECUTION

3.01 FIELD ADJUSTMENT

- A. Contractor shall adjust relay and protective device settings according to the recommended settings table provided by the coordination study.
- B. Contractor shall make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.
- C. Square D or approved equal manufacturer's engineering services shall notify Owner in writing of any required major equipment modifications.

3.02 ARC FLASH LABELS

- A. Square D or approved equal manufacturer's engineering services shall provide a 4.0 in. x 4.0 in. Brady thermal transfer type label of high adhesion polyester for each work location analyzed.
- B. The labels shall be designed according to the following standards:
 1. UL969 - Standard for Marking and Labeling Systems
 2. ANSI Z535.4- Product Safety Signs and Labels
 3. NFPA 70 (National Electric Code)- Article 110.16
- C. The label shall include the following information:
 1. System Voltage
 2. Flash protection boundary
 3. Personal Protective Equipment category
 4. Arc Flash Incident energy value (cal/cm²)
 5. Limited, restricted, and prohibited Approach Boundaries
 6. Study report number and issue date
- D. Labels shall be printed by a thermal transfer type printer, with no field markings.
- E. Arc flash labels shall be provided for equipment as identified in the study and the respective equipment access areas per the following:
 1. Floor Standing Equipment - Labels shall be provided on the front of each individual section. Equipment requiring rear and/or side access shall have labels provided on each individual section access area. Equipment line-ups containing sections with multiple incident energy and flash protection boundaries shall be labeled as identified in the Arc Flash Analysis table.
 2. Wall Mounted Equipment- Labels shall be provided on the front cover or a nearby adjacent surface, depending upon equipment configuration.
 3. General Use Safety labels shall be installed on equipment in coordination with the Arc Flash labels. The General Use Safety labels shall warn of general electrical hazards associated with shock, arc flash, and explosions, and instruct workers to turn off power prior to work.
- F. Labels shall be field installed by Square D Services or approved equal manufacturer's engineering services. The technician providing the installation shall have completed an 8-Hour instructor led Electrical Safety Training Course with includes NFPA 70E material including the selection of personal protective equipment.

**SECTION 260574 - ARC FLASH HAZARD ANALYSIS AND SHORT CIRCUIT COORDINATION STUDY
H2M**

3.03 ARC FLASH TRAINING

- A. The vendor supplying the Arc Flash Hazard Analysis shall train the owner's qualified electrical personnel of the potential arc flash hazards, associated with working on energized equipment (minimum of 4 hours). The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET) or equivalent. The trainer shall be an authorized OSHA Outreach instructor.
- B. The vendor supplying the Arc Flash Hazard Analysis shall offer instructor led and online NFPA 70E training classes.

END OF SECTION

SECTION 260583 - WIRING CONNECTIONS **H2M**

PART 2 PRODUCTS

1.01 EQUIPMENT CONNECTIONS

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Occupancy sensors.

1.02 RELATED REQUIREMENTS

- A. Section 260529 - Hangers and Supports for Electrical Systems.
- B. Section 260533.16 - Boxes for Electrical Systems.
- C. Section 262726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.
 - 1. Includes finish requirements for wall controls specified in this section.
 - 2. Includes accessory receptacles, switches, dimmers and wall plates, to match lighting controls specified in this section.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 - 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.
- C. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
- D. Field Quality Control Reports.
- E. Operation and Maintenance Data: Include detailed information on device programming and setup.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.07 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
 - 2. Sensor Switch Inc; _____: www.sensorswitch.com/#sle.
 - 3. WattStopper; _____: www.wattstopper.com/#sle.
- B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
 - 5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
 - 6. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 - 7. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
- C. Wall Switch Occupancy Sensors:
 - 1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).

- c. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
 - d. Provide selectable audible alert to notify occupant of impending load turn-off.
 - e. Provide vandal resistant lenses for passive infrared (PIR) and dual technology wall switch occupancy sensors where indicated.
 - 2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq m).
- D. Ceiling Mounted Occupancy Sensors:
- 1. All Ceiling Mounted Occupancy Sensors:
 - a. Description: Low profile occupancy sensors designed for ceiling installation.
 - b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
 - c. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
 - d. Finish: White unless otherwise indicated.
 - 2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
 - a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet (41.8 sq m) at a mounting height of 9 feet (2.7 m), with a field of view of 360 degrees.
- E. Power Packs for Low Voltage Occupancy Sensors:
- 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
 - 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
 - 3. Input Supply Voltage: Dual rated for 120/277 V ac.
 - 4. Load Rating: As required to control the load indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.

- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of lighting control devices provided under this section.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 262726.
- G. Provide required supports in accordance with Section 260529.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- I. Occupancy Sensor Locations:
 - 1. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet (1.2 m) from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.
- J. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.
- K. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.
- C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 COMMISSIONING

- A. See Section 019113 - General Commissioning Requirements for commissioning requirements.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Materials and installation requirements for cast-in-place concrete equipment pads.
- B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260533.13 - Conduit for Electrical Systems.
- F. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 262416 - Panelboards: Service entrance equipment.
- H. Section 264300 - Surge Protective Devices: Service entrance surge protective devices.
- I. Section 312316 - Excavation.
- J. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
- K. Section 312323 - Fill: Bedding and backfilling.

1.03 DEFINITIONS

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.04 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: As indicated on drawings.
- D. Division of Responsibility:
 - 1. Pad-Mounted Utility Transformers:
 - a. Transformer Pads: Furnished and installed by Contractor per Utility Company requirements.
 - b. Transformers: Furnished and installed by Utility Company.
 - c. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
 - d. Transformer Protective Bollards: Furnished and installed by Contractor per Utility Company requirements.
 - e. Primary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Utility Company.
 - f. Secondary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
 - 2. Terminations at Service Point: Provided by Utility Company.
 - 3. Metering Provisions:
 - a. Meter Bases: Furnished and installed by Contractor per Utility Company requirements.
 - b. Metering Transformer Cabinets: Furnished and installed by Contractor per Utility Company requirements.
 - c. Metering Transformers: Furnished and installed by Utility Company.
 - d. Conduits Between Metering Transformers and Meters: Furnished and installed by Contractor per Utility Company requirements.
 - e. Wiring Between Metering Transformers and Meters: Furnished and installed by Utility Company.
 - f. Communications Conduits for Meters: Furnished and installed by Contractor per Utility Company requirements.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.

- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required trenching and backfilling in accordance with Section 312316.13.
- E. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 033000.
- F. Provide required protective bollards in accordance with Utility Company requirements.
- G. Provide required support and attachment components in accordance with Section 260529.
- H. Provide grounding and bonding for service entrance equipment in accordance with Section 260526.
- I. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 260553.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General purpose transformers.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260533.13 - Conduit for Electrical Systems: Flexible conduit connections.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 262416 - Panelboards.
- G. Section 262713 - Electricity Metering: Instrument transformers for electrical metering.

1.03 REFERENCE STANDARDS

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.
- B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers; 2015.
- C. IEEE C57.96 - IEEE Standard Guide for Loading Dry-Type Distribution and Power Transformers; 2013.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2015.
- F. NEMA ST 20 - Dry Type Transformers for General Applications; 2021.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.
- J. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

- C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.
- D. Source Quality Control Test Reports: Include reports for tests designated in NEMA ST 20 as design and routine tests.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Maintenance Data: Include recommended maintenance procedures and intervals.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB: www.electrification.us.abb.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric: www.se.com/#sle.

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
- B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
 - 1. Altitude: Less than 3,300 feet (1,000 m).
 - 2. Ambient Temperature:
 - a. Greater than 10 kVA: Not exceeding 104 degrees F (40 degrees C).
 - b. Less than 10 kVA: Not exceeding 77 degrees F (25 degrees C).
- C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hygroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
- E. Basic Impulse Level: 10 kV.
- F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- G. Isolate core and coil from enclosure using vibration-absorbing mounts.

- H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

- A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
- B. Insulation System and Allowable Average Winding Temperature Rise:
 - 1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
 - 2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
- C. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
- D. Winding Taps:
 - 1. Less than 3 kVA: None.
 - 2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
 - 3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
 - 4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
- E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
- F. Sound Levels: Standard sound levels complying with NEMA ST 20.
- G. Mounting Provisions:
 - 1. Less than 15 kVA: Suitable for wall mounting.
 - 2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
 - 3. Larger than 75 kVA: Suitable for floor mounting.
- H. Transformer Enclosure: Comply with NEMA ST 20.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor clean, dry locations: Type 2.
 - 2. Construction: Steel.
 - a. Less than 15 kVA: Totally enclosed, non-ventilated.
 - b. 15 kVA and Larger: Ventilated.
 - 3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
 - 4. Provide lifting eyes or brackets.
- I. Accessories:
 - 1. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

- C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install transformers in accordance with NECA 409 and IEEE C57.94.
- D. Use flexible conduit, under the provisions of Section 260533.13, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.
- F. Install transformers plumb and level.
- G. Transformer Support:
 - 1. Provide required support and attachment in accordance with Section 260529, where not furnished by transformer manufacturer.
 - 2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
 - 3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 033000.
 - 4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- H. Provide grounding and bonding in accordance with Section 260526.
- I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
- J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.

3.03 ADJUSTING

- A. Measure primary and secondary voltages and make appropriate tap adjustments.
- B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.04 CLEANING

- A. Clean dirt and debris from transformer components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Distribution panelboards.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electric Code.
- B. NECA Standard of Installation.
- C. NEMA AB1 - Molded Case Circuit Breakers.
- D. NEMA PB1 - Panelboards.
- E. NEMA PB1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- F. NEMA ICS2 - Industrial Control Devices, Controllers and Assemblies.
- G. NEMA KS1 - Enclosed Switches.

1.03 SUBMITTALS

- A. Submit product data under provisions of Section 013300.
- B. Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, and circuit breaker arrangement and sizes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. New Panelboards
 - 1. Panelboards shall be manufactured by Square D.
 - 2. Approved equal.

2.02 PANELBOARD REQUIREMENTS

- A. Provide panelboards of circuit breaker, dead-front safety type, UL labeled, and meeting all applicable requirements of the National Electrical Manufacturers Association.
- B. Provide panelboards with lugs (both main lugs and branch circuit lugs) suitable and UL approved for both aluminum and copper conductors.
- C. Provide electrically isolated neutral bars.
- D. Provide separate ground bars complete with lugs or connectors on bar.
- E. Provide key operated door and door lock. Door shall prevent access to operate circuit breakers.
- F. Provide panelboards with sequence phased bus bars or distributed phase bussing for voltage and phase as indicated on drawings.
- G. Refer to drawings for numbers of branch circuits, their ratings, number of poles, arrangements, etc.

- H. Provide typed circuit directory cards.
- I. Provide front filler plates for unused breaker knockouts.
- J. Refer to drawings for Ratings and Features.
- K. All bus bars, including ground bars shall be tin-plated copper.
- L. All circuit breakers shall be bolt-on type.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Ground separate ground bars to panel boxes and to the main service entrance ground bus with a code-sized grounding conductor installed in the same conduit as the phase and neutral conductors under provisions of Section 260526.
- B. Install all circuits using a common neutral bus bay in accordance with the National Electric Code. Balance all circuits to achieve not greater than 7% unbalanced neutral current in panel feeders.
- C. Provide six circuit breaker handle lock-on devices for each lighting and miscellaneous power panelboard for installation by the contractor on circuits as directed by the Engineer to prevent unauthorized personnel from turning off circuits to controls, unit heaters, autodial alarm system, etc. Provide spare lock-on devices over to the Engineer.
- D. Install panelboards in accordance with NEMA PB 1.1.
- E. Install panelboards plumb.
- F. Height: 6 feet (2 m) to top of panel board.
- G. Provide typed circuit directory for each branch circuit panelboard. Handwritten circuit directory cards will not be accepted. Revise directory to reflect circuiting changes required to balance phase loads.
- H. Provide a typed circuit directory in accordance with NEC sections 110.22 and 408.4. Circuits shall be labeled with detailed information describing the switches function and equipment location.
- I. Revise directory to reflect circuiting changes required to balance phase loads.
- J. Provide engraved plastic nameplates under the provisions of Section 260553.
- K. Panelboards shall be factory installed in the motor control center by the manufacturer of Motor Control Center where indicated on drawings.

3.02 FIELD QUALITY CONTROL

- A. Maintain proper phasing for multi-wire branch circuits.

- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section 260533.23 - Surface Raceways for Electrical Systems: Surface raceway systems, including multioutlet assemblies.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 260923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
- E. Provide GFCI protection for receptacles installed in kitchens.
- F. Provide GFCI protection for receptacles serving electric drinking fountains.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with stainless steel wall plate.
- C. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

2.03 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

- A. Manufacturers:
 - 1. Hubbell Incorporated; _____: www.hubbell.com/#sle.
 - 2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - 2. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.05 WALL PLATES

- A. Manufacturers:
 - 1. Hubbell Incorporated; _____: www.hubbell-wiring.com/#sle.
 - 2. Leviton Manufacturing Company, Inc; _____: www.leviton.com/#sle.
 - 3. Pass & Seymour, a brand of Legrand North America, Inc; _____: www.legrand.us/#sle.
- B. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard; _____.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.

- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches (1200 mm) above finished floor.
 - b. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

PART 2 PRODUCTS

1.01 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 262813 - Fuses.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- E. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- F. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Eaton Corporation; _____: www.eaton.com/#sle.
- B. Schneider Electric; Square D Products; _____: www.schneider-electric.us/#sle.
- C. Siemens Industry, Inc; _____: www.usa.siemens.com/#sle.
- D. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet (2,000 m).
 - 2. Ambient Temperature: Between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C).
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 - 2. Minimum Ratings:
 - a. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.
- G. Provide with switch blade contact position that is visible when the cover is open.
- H. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
 - 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- I. Conductor Terminations: Suitable for use with the conductors to be installed.
- J. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- K. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
- L. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install enclosed switches plumb.

SECTION 262816.16 - ENCLOSED SWITCHES **H2M**

- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 260526.
- H. Provide fuses complying with Section 262813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

3.02 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

PART 2 PRODUCTS

1.01 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mouonted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- D. Protected Modes:
- E. UL 1449 Voltage Protection Ratings (VPRs):
- F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- G. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

END OF SECTION

PART 2 PRODUCTS

1.01 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

END OF SECTION

SECTION 284600 - FIRE DETECTION AND ALARM **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.

1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Proposal Documents: Submit the following with cost/time proposal:
 - 1. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 2. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
 - 3. Certification by Contractor that the system design will comply with Contract Documents.
 - 4. Proposed maintenance contract.
- C. Drawings must be prepared using AutoCAD Release 14.
- D. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
 - 1. Copy (if any) of list of data required by authority having jurisdiction.
 - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 3. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 - 4. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
 - 5. Certification by Contractor that the system design complies with Contract Documents.
 - 6. Do not show existing components to be removed.
- E. Evidence of installer qualifications.
- F. Inspection and Test Reports:
 - 1. Submit inspection and test plan prior to closeout demonstration.
 - 2. Submit documentation of satisfactory inspections and tests.
 - 3. Submit NFPA 72 "Inspection and Test Form," filled out.
- G. Project Record Documents: See Section 017800 for additional requirements; have one set available during closeout demonstration:

SECTION 284600 - FIRE DETECTION AND ALARM^{H2M}

1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
2. "As installed" wiring and schematic diagrams, with final terminal identifications.
3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
 1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Alarm Control Units and Accessories - Basis of Design: Edwards.
- B. Initiating Devices and Notification Appliances:
 1. Same manufacturer as control units.

2.02 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide modifications and extensions to the existing automatic fire detection and alarm system:
 1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 2. Existing Fire Alarm Control Unit is an Edwards EST-3.
 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the local authority having jurisdiction.
 - c. Applicable local codes.
 - d. Contract Documents (drawings and specifications).
 - e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
- B. Circuits:
 1. Initiating Device Circuits (IDC): Class B, Style A.
 2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
 3. Notification Appliance Circuits (NAC): Class B, Style W.
- C. Power Sources:
 1. Primary: Dedicated branch circuits of the facility power distribution system.
 2. Secondary: Storage batteries.
 3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
 4. Each Computer System: Provide uninterruptible power supply (UPS).

2.03 EXISTING COMPONENTS

- A. Existing Fire Alarm System: Remove existing components indicated and incorporate remaining components into new system, under warranty as if they were new; do not take existing portions of system out of service until new portions are fully operational, tested, and connected to existing system.
- B. Clearly label components that are "Not In Service."
- C. Remove unused existing components and materials from site and dispose of properly.

2.04 FIRE SAFETY SYSTEMS INTERFACES

- A. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
 - 1. Kitchen hood suppression activation; also disconnect fuel source from cooking equipment.
 - 2. Duct smoke detectors.
- B. HVAC:
 - 1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

2.05 COMPONENTS

- A. General:
 - 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 - 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Addressable Fire Alarm Control Unit - Basis of Design: Edwards.
- D. Initiating Devices:
 - 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
 - 2. Smoke Detectors: Edwards.
 - 3. Heat Detectors: Edwards.
- E. Notification Appliances:
 - 1. Strobes: Edwards Genesis Series.
- F. Circuit Conductors: Copper; provide 200 feet (60 m) extra; color code and label.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

3.02 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.03 CLOSEOUT

END OF SECTION

APPENDIX

FINAL REPORT FOR ENVIRONMENTAL INSPECTION SERVICES –
ROCHAMBEAU ALTERNATIVE HIGH SCHOOL (DATED 07/18/2024)

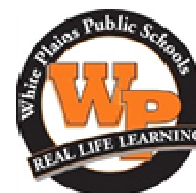
REGULATED BUILDING MATERIALS SURVEY REPORT

For

**Rochambeau Alternative High School
228 Fisher Ave
White Plains, New York 10606**

Prepared For:

**White Plains City School District
5 Homeside Lane
White Plains, New York 10605**



Prepared By:

**Langan Engineering, Environmental, Surveying,
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**Craig Napolitano, CHMM
Associate**

LANGAN

**July 18, 2024
Langan Project No. 101061160**

TABLE OF CONTENTS

	<u>Page No.</u>
ACRONYMS	ii
EXECUTIVE SUMMARY	1
KEY FINDINGS	2
1.0 INTRODUCTION	3
1.1 Purpose.....	3
1.2 Assumptions, Limitations and Exceptions.....	4
2.0 SITE DESCRIPTION	4
3.0 ASBESTOS CONTAINING MATERIALS	5
3.1 Terminology	5
3.2 Survey Methodology	6
3.3 Files Review	6
3.4 Observations and Findings	7
3.5 Condition and Friability Assessment Table	7
4.0 LEAD CONTAINING PAINT	8
4.1 Terminology	8
4.2 Limited Screening Survey Methodology.....	8
4.3 LBP Findings.....	9
5.0 PCBs SURVEY FINDINGS	10
5.1 Limited Survey Methodology	10
5.2 PCBs Findings	10
6.0 CONCLUSIONS	11
6.1 Asbestos Containing Materials.....	11
6.2 Lead Containing Paint	11
6.3 Polychlorinated Biphenyls (PCBs) Containing Materials.....	12
7.0 STATEMENT OF QUALIFICATIONS AND SIGNATURES	13

TABLES

Table 1	Summary of Asbestos Survey Findings
Table 2	Lead Based Paint XRF Screening Data
Table 3	Bulk PCB Caulk Sample Analyses Results

FIGURES

ASL-1 thru	Asbestos Sampling Locations
ASL-3	

APPENDICES

Appendix A	Laboratory Test Results and Chain of Custody Documentations (Asbestos)
Appendix B	Laboratory Results and Chain-of-Custody Documentation (PCB Caulk)
Appendix C	Langan's Certifications and Laboratory Accreditations
Appendix D	File Search/Archive Materials/Scope of Work Drawings

ACRONYMS

RBM	Regulated Building Materials (RBM) includes but is not limited to (Asbestos Containing Materials (ACM), Lead Containing Paint (LCP), Polychlorinated Biphenyls (PCBs), Ozone Depleting Substances (ODS), Radioactive Sources, Oil-containing Equipment, Universal Waste, and Electronic Wastes
USEPA	United States Environmental Protection Agency
NYSDOL	New York State Department of Labor
ASHERA	Asbestos Hazard Emergency Response Act
OSHA	Occupational Safety and Health Administration
CAA	Clean Air Act
TSCA	Toxic Substance Control Act
CFR	Code of Federal Regulation
EPA	United States Environmental Protection Agency
HEPA	High Efficiency Particulate Air
HUD	Housing and Urban Development
NESHAPS	National Standards for Hazardous Air Pollutants
RCRA	Resource Conservation and Recovery Act
PLM	Polarized Light Microscopy
TEM	Transmission Electron Microscopy
ACM	Asbestos-Containing Materials
LBP	Lead-Based Paint
PCB	Polychlorinated Biphenyls (PCB)
SF	Square Feet
LF	Linear Feet
mg/cm ²	Milligrams per square centimeter
PPM	Parts Per Million
XRF	X-ray Fluorescence
AAS	Atomic Absorption Spectrometry
TCLP	Toxicity Characteristic Leaching Procedure
	Definition of Regulated building materials will be needed

EXECUTIVE SUMMARY

This report by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) on behalf of the White Plains City School District and summarizes regulated building materials (RBM) survey findings for the select areas of Rochambeau Alternative High School, at 228 Fisher Ave, White Plains, NY 10606. To address potential exposure by the planned building renovations, the objective of this RBM survey was to identify the presence/absence of asbestos-containing materials (ACM), lead containing paint (LCP) and polychlorinated biphenyls (PCBs) containing caulk/sealants.

PROJECT INFORMATION:

Client Name:	White Plains City School District	Survey Dates:	06/10/2024 & 06/11/2024
Professional's Project #:	101061160	Construction Dates:	Circa 1920s original construction
Professional's Project Manager:	Craig Napolitano	No. of Building(s):	1
Phone No.:	646-210-6500	No. of Stories:	4
Email:	cnapolitano@langan.com	Estimated Gross Footage:	Unknown SF
Property Address:	228 Fisher Ave	Basement:	Yes
Property Town, County, State:	White Plains, New York 10606	Property Use:	Elementary School
Property Identification:	---	Last Altered	---

KEY FINDINGS

Asbestos-Containing Materials (ACM)

The following materials were reported to contain asbestos exceeding one percent (>1%) and are ACM or were not sampled but are assumed as ACM:

Material	Location	Survey Results		Estimated Quantity
ACM/ASSUMED ACM FINDINGS WITHIN SURVEYED BUILDING AREAS				
Building Interiors				
Millboard Type 1	Rm 121	ACM	CHRY 2.5%	150 SF
Millboard Type 2	Rm 305	ACM	CHRY 2.5%	30 SF
Cove Base	Rm 116B (Kitchen Office) & 111A (Vestibule)	ACM Contaminated	--	90 SF
Cove Base Mastic		ACM	CHRY 2.5%	
9" x 9" Floor Tile & Mastic	Rm 117 (Lounge)	ACM per 2022 AHERA	--	1,300 SF
	Rm 116 (Kitchen)*			
	Rm 116B (Pantry)*			
	Rm 111A (Vestibule)*			
Acoustical Wall Plaster	Auditorium	ACM per 2022 AHERA	--	7,000 SF
Electrical components i.e., Wiring Insulation, etc.		Assumed ACM	--	TBD LF
1' x 1' Ceiling Tiles		Assumed ACM	--	3,400 SF
Door Insulation	Throughout	Assumed ACM	--	34 DR

* 9"x9" Floor Tile & Mastic underneath non-ACM 12"x12" Floor Tile & Mastic. 12"x12" Floor Tile & Mastic to be removed as part of 9"x9" Floor Tile & Mastic removal.

The bulk samples collected by Langan from the other suspect building materials were reported by the laboratory as "no asbestos detected". Refer to Table 1 for a summary of asbestos survey findings and Appendix A for a copy of test results and chain of custody documentation.

Lead Containing Paint (LCP)

Langan conducted 49 assays using an X-Ray Fluorescence (XRF) analyzer to screen the structure to identify lead concentrations in painted surfaces. Of the 49 XRF readings, 7 measurements had detectable concentrations of lead above 1.0 mg/cm². The paint on following building components were identified to contain lead above 1.0 mg/cm².

- 2nd Floor Wood Door Rm 313C, Gray Paint, 4.9 mg/cm².
- 2nd Floor Wood Door Frame Rm 313C, Gray Paint, 1.4 mg/cm².
- 3rd Floor Metal Window Grate Gymnasium, White Paint 15.9 mg/cm².
- Roof Metal Door Frame Cupola Roof D, White Paint 26.7 mg/cm².
- Roof Metal Exterior Siding Cupola Roof D, White Paint 20.5 mg/cm².
- Roof Metal Interior Beams Cupola Roof D, Black Paint 3.6 mg/cm².
- Roof Interior Ladder Cupola Roof D, Red Paint 6.7 mg/cm².

Overall, the paint on various building components was observed in good condition. Refer to Table 2 for the XRF screening data.

PCBs Findings

As per USEPA Code of Federal Regulations (40 CFR 761.3) a PCB containing bulk product is any product which contains a concentration of PCB >50 PPM. Any product which contains <50 PPM PCB is considered a non-PCB product. One (1) composite bulk sample of suspect caulking/sealant was collected. None of the sampled caulks were reported to have concentrations of PCBs equal to and above 50 parts per million (ppm) (>50ppm). Laboratory analytical data are summarized in Table 3 and test results and chain of custody documentation is included in Appendix B.

1.0 INTRODUCTION

1.1 Purpose

This report by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) on behalf of the White Plains School District summarizes the regulated building materials (RBM) survey findings for the Rochambeau Alternative High School renovation project, located at 228 Fisher Ave, White Plains, NY 10606.

To address potential exposure by the planned building renovation, the objective of this RBM survey was to identify the presence/absence of asbestos-containing materials (ACM), lead containing paint (LCP), polychlorinated biphenyls (PCBs) containing caulk/sealants that may be disturbed in the upcoming renovation.

The remainder of this report presents our observations, findings, laboratory test results of samples collected, plans showing sampling locations, approximate locations of ACM and conclusions.

1.2 Assumptions, Limitations and Exceptions

Opinions, conclusions and recommendations presented in this report apply to the site conditions those reasonably foreseeable based solely upon Langan's visual observations of accessible areas, laboratory test data, and current regulatory requirements. They cannot necessarily apply to conditions and features of which Langan is unaware and has not had the opportunity to evaluate. The conclusions noted in this report are intended exclusively for the purpose stated herein, at the site indicated, and for the project indicated.

No survey method can completely eliminate the possibility of obtaining partial, imprecise, or incomplete information. Thus, the report does not warranty, guaranty, or represent that the surveys completely defined the locations, and/or condition of any RBMs and hazardous materials. Professional judgment was exercised in gathering and analyzing the information obtained, and Langan performed our services using that degree of skill and care ordinarily exercised under similar conditions by reputable members of Langan's profession practicing in the same or similar locality at the time of our performance.

Any suspect materials found during building remodeling, renovation or demolition which differ from materials sampled as part of this survey should be assumed to be asbestos-containing until surveyed by a properly trained and certified individual and tested by an accredited laboratory.

2.0 SITE DESCRIPTION

The surveyed Rochambeau Alternative High School is located at 228 Fisher, White Plains, New York and it belongs to the White Plains School District with facilities approximately 90 years old. The school district is located approximately 30 miles north of New York City in Westchester County NY.

The four-story subject building is constructed out brick and steel and houses an Alternative High School.

3.0 ASBESTOS CONTAINING MATERIALS

3.1 Terminology

Suspect Asbestos-Containing Materials

Asbestos was used in certain types of construction and building materials. A few examples of these materials include floor tiles, ceiling panels, thermal system insulation, fireproofing insulation, roofing materials, etc. Until a material is examined using light microscopy or a similar technique, the building material is considered as a suspect asbestos-containing material. Any suspect ACM of unknown asbestos content (that is not tested) should be handled as if it were an asbestos containing material.

Asbestos-Containing Material (ACM)

According to Federal Environmental Protection Agency (EPA) National Emission Standards for Hazardous Air Pollutants (NESHAP), OSHA, New York State Department of Labor, Industrial Code Rule 56 (NYSDOL-ICR56) regulations, a material that is confirmed to contain greater than one percent ($>1\%$) asbestos by polarized-light microscopy (PLM) analysis is classified as ACM. Under current EPA-NESHAP and NYSDOL-ICR56 regulations, materials that are confirmed to contain one percent or less asbestos ($<1\%$) are considered non-ACM and are not regulated. However, the Occupational Safety and Health Administration (OSHA) still regulates these materials under its asbestos regulations. Therefore, there can be situations where EPA NESHAP regulations may not apply for specific materials, but OSHA regulations are applicable.

The EPA rule concerning the application, removal, and disposal of ACM is administered under NESHAP regulations 40 CFR 61.145, Subpart M – Standard for Demolition and Renovation. NESHAP only regulates ACM when it meets certain criteria, which is called Regulated ACM (RACM). RACM consists of

- Friable asbestos material
- Category I non-friable ACM that has become friable
- Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or
- Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by this subpart.

Whether Friable or Category I & II materials, all ACM are regulated as per the NYSDOL-ICR56 regulations.

3.2 Survey Methodology

Langan conducted an ACM survey in general accordance with the applicable requirements of current EPA NESHAP Standard 40 CFR 61, Subpart M (Asbestos), NYSDOL-ICR56, and OSHA 29 CFR 1926.1101 asbestos survey and/or sampling protocols and sound judgement of the asbestos inspector(s).

Destructive and intrusive inspection techniques were not employed. Langan inventoried, classified, and collected representative bulk samples from suspect homogeneous areas (HAs) and submitted the samples for analysis. HAs are materials that appear similar in color, texture, and date of material application. The condition, and approximate location of each identified suspect ACM were documented.

Samples collected were properly packaged in individual plastic bags, sealed; catalogued and chain-of-custody documentation was completed. Laboratory analysis was performed following EPA 600/R-93/116 Method using Polarized Light Microscopy with Dispersion Staining (PLM/DS) which utilizes Visual Area Estimation (VAE) for determining concentrations of asbestos in a sample. Non-friable organically bound (NOB) materials which tested non-ACM via PLM were analyzed using transmission electron microscopy (TEM). Analytical testing was performed in accordance with NYSELAP Methods 198.1 (friable materials), 198.1(NOB), 198.4 (NOB-TEM), and 198.8 (surfacing materials containing vermiculite). Samples were analyzed by AmeriSci laboratory of New York (AmeriSci). AmeriSci is a member of the American Industrial Hygiene Association (AIHA), National Voluntary Laboratory Accreditation Program (NVLAP).

3.3 Files Review

Langan received and reviewed the following reports:

- WSP AHERA Management Plan dated August 2022
- Louis Berger Project 3000828 dated September 2013
- Louis Berger Project 3000865.00 dated November 2013
- Louis Berger Project 2042261.035 dated March 2018

3.4 Observations and Findings

The ACM survey of the subject building areas was conducted on June 10th & 11th 2024 by Langan's Frank Acciarito & Drew Cheskin, NYSDOL certified asbestos inspectors and USEPA certified lead inspector. During the survey, suspect materials observed in the surveyed building areas were documented, assessed, quantified, and sampled as necessary.

Suspect materials identified as having asbestos content greater than one percent by weight are considered to be "positive" for asbestos in accordance with the EPA/NYSDOL definition of an asbestos-containing material. In general, suspect materials identified in the building were in good to fair conditions.

Refer to [Table 1](#) for a detailed summary of asbestos survey findings. A copy of analytical results and chain of custody documentation for the samples collected during the surveys is provided in [Appendix A](#). Asbestos sampling locations are depicted on Figures.

3.5 Condition and Friability Assessment Table

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

Material	Location	Friability	Condition	Estimated Quantity
Millboard Type 1	Rm 121	Yes	Good	150 SF
Millboard Type 2	Rm 305	Yes	Good	30 SF
Cove Base	Rm 116B (Kitchen Office) & 111A (Vestibule)	No	Good	90 SF
Cove Base Mastic		No	Good	
9" x 9" Floor Tiles & Mastic	Rm 117 (Lounge)	No	Good	1,300 SF
	Rm 116 (Kitchen)			
	Rm 116B (Pantry)			
	Rm 111A (Vestibule)			
Acoustical Wall Plaster	Auditorium	Yes	Good	7,000 SF
Electrical component i.e., Wiring Insulation, etc;		TBD	TBD	TBD LF
1' x 1' Ceiling Tiles		TBD	Good	3,400 SF
Door Cores	Throughout	TBD	TBD	34 DR

Condition Definitions:

Good: None/Minimal apparent damage to ACM

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

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

4.0 LEAD CONTAINING PAINT

4.1 Terminology

Lead Based Paint

As per EPA 40 CFR Part 745, TSCA, Title IV (Lead Exposure Reduction) the term “lead-based paint” means paint or other surface coatings that contain lead equal to or in excess of 1.0 milligrams per centimeter squared (1.0 mg/cm^2) or more than 0.5 percent by weight. Although Langan recognizes that the EPA definition of LBP is only applicable to certain residential and child-occupied structures, we are using the EPA LBP definition as a threshold for reporting.

Lead Containing Paint (LCP) or Material Containing Lead

Occupational Safety and Health Administration (OSHA) consider any measurable concentration of lead in paint or material to be lead containing paint (LCP) or lead containing material (LCM).

4.2 Limited Screening Survey Methodology

On June 11th, 2024, Langan conducted a limited lead paint screening test of painted building components. The purpose of the lead paint screening was to determine the general presence of lead-containing paints at the site. OSHA considers any concentration of lead in paint to be lead containing paint according to the OSHA Lead in Construction standard (29 CFR 1926.62).

A Heuresis Pb200i X-Ray Fluorescence (XRF) Spectrum Analyzer was used to survey the subject building for the presence of lead-containing paint (LCP). The Heuresis Pb200i analyzer uses a cobalt 57 radioactive source and an advanced solid-state radiation detector to generate an x-ray fluorescence spectrum of a painted surface. During the analysis, the intensity of the x-rays is converted by the instrument’s internal software into an estimate of the concentration of lead in the substance being analyzed. The results are interpreted as concentrations of lead in milligrams per square centimeter (mg/cm^2). This device is a field-screening tool, used to collect multiple readings in a short period of time. The method of measurement is based on spectrometric analysis of

lead x-ray fluorescence within a controlled depth of interrogation. The reading is an estimate of lead content in all layers of paint.

Not all painted surfaces were tested within the surveyed building areas as the purpose of the limited screening testing was to ascertain a general understanding of the presence of lead-containing paint and coatings throughout the building. Building components were selected for testing based upon the frequency of their appearance throughout the building and relevance for significantly impacting the proposed interior demolition and renovation activities and not for determining the potential lead hazards related to occupancy of the building.

For quality control, the XRF instrument was calibrated using a U.S. Department of Commerce. National Institute of Standards and Technology (NIST) Level III 1.0 mg/cm² lead based paint film. For each calibration, three (3) XRF readings were taken on the paint film. The average of these three (3) readings was then subtracted from the known lead content in the paint film. The difference was compared with an Environmental Protection Agency (EPA)-approved tolerance range. Such calibration procedures were conducted at the start and at the end of the workday.

4.3 LBP Findings

Based on the XRF screening data, the paint on following building components was identified to contain lead above 1.0 mg/cm²:

- 2nd Floor Wood Door Rm 313C, Gray Paint, 4.9 mg/cm².
- 2nd Floor Wood Door Frame Rm 313C, Gray Paint, 1.4 mg/cm².
- 3rd Floor Metal Window Grate Gymnasium, White Paint 15.9 mg/cm².
- Roof Metal Door Frame Cupola Roof D, White Paint 26.7 mg/cm².
- Roof Metal Exterior Siding Cupola Roof D, White Paint 20.5 mg/cm².
- Roof Metal Interior Beams Cupola Roof D, Black Paint 3.6 mg/cm².
- Roof Interior Ladder Cupola Roof D, Red Paint 6.7 mg/cm².

In general, the painted surfaces were observed in good to fair condition. Localized areas of minor damage were observed. Refer to Table 2 for the XRF screening data.

5.0 PCBs SURVEY FINDINGS

5.1 Limited Survey Methodology

PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications.

Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 PCB ban. Products that may contain PCBs include: Transformers and capacitors, Oil used in motors and hydraulic systems, Fluorescent light ballasts, Adhesives and tapes, Caulking, Plastics, etc.

PCBs are regulated under the EPA Toxic Substance Control Act (TSCA) regulations (40 CFR 261) program as well as EPA regulation 40 CFR 761. As per EPA 40 CFR 761.3, PCB-containing bulk product waste is any waste from demolition or renovation projects which contains PCBs concentration greater than 50 mg/kg. Any product containing less than 50 mg/kg PCBs is considered a non-PCB product.

A PCB screening sampling involved a visual examination of the building and sampling of suspect caulking or sealant materials.

5.2 PCBs Findings

As per USEPA Code of Federal Regulations (40 CFR 761.3) a PCB containing bulk product is any product which contains a concentration of PCB >50 PPM. Any product which contains <50 PPM PCB is considered a non-PCB product.

In the one (1) sample PCBs were either not detected or found in concentrations less than 50 ppm in all caulk samples analyzed. Laboratory analytical data are summarized in Table 3 and test results and chain of custody documentation is included in Appendix B

6.0 CONCLUSIONS

6.1 Asbestos Containing Materials

Asbestos containing materials were identified in the building surveyed areas. Refer to Table 1 for the summary of a limited asbestos survey findings. Identified ACM affected by the scope of work shall only be removed by a properly certified asbestos abatement contractor in accordance with applicable federal, state, and local regulations prior to being disturbed, including maintenance, renovation, or demolition activities. As required by the NYS-DOL regulations, the abatement project must be monitored by a NYS-DOL certified project monitor. Proper notifications must be filed with the US-EPA, NYS-DOL and other regulatory agencies prior to performing such activities.

In accordance with the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) established National Emission Standards for hazardous Air Pollutants (NESHAP) to protect the public from exposure to airborne pollutants. Asbestos was one of the air pollutants, which was addressed under the NESHAP 40 CFR Part 61. The purpose of asbestos NESHAP regulations is to protect the public health by minimizing the release of asbestos when facilities, which contain ACM, are being renovated or demolished. The EPA is responsible for enforcing regulations related to asbestos during renovations and demolition, however, the CAA allows the EPA to delegate this authority to State and Local Agencies. Even after EPA delegate's responsibility to a state or Local agency, EPA retains the authority to oversee agency performance and to enforce NESHAP regulations as appropriate.

6.2 Lead Containing Paint

Painted surfaces in the building contain detectable concentrations of lead. The OSHA Lead in Construction Standard does not currently define a specific concentration of lead that must be present within paint for it to be considered "lead-containing." Therefore, painted and glazed surfaces that contain detectable concentrations of lead must be handled in accordance with the OSHA Lead in Construction Standard. Persons performing work that could impact paint films or glazing that have detectable concentrations of lead should be informed of the testing results and take appropriate actions to comply with the OSHA Lead in Construction Standard.

Personnel performing work on lead-containing surface coatings must have, at a minimum, two-hour lead awareness training in accordance with OSHA Standard 29 CFR

1926.62. If lead-containing surface coatings are required to be stripped or removed from the building component substrate in the areas noted above with lead-containing paint, then additional training would be required based upon the measured lead concentration of the surface coating and the airborne lead concentrations measured during the work activity.

The handling, disposal, and management of waste generated during any restoration, renovation, or demolition operations is regulated by the Resource Conservation and Recovery Act (RCRA) regulations, Standards 40 CFR 240 - 280. These regulations require that a Toxic Characteristic Leaching Procedure (TCLP) test be utilized to determine if the waste generated during demolition, renovation, or removal projects is considered hazardous waste. A material is considered hazardous if it is ignitable, reactive, corrosive, or toxic. Toxicity is determined by TCLP analysis, which simulates the migration of a contaminant, such as cadmium, arsenic, or lead, in a disposal site. TCLP sampling was not part of the scope of work for this project. Therefore, prior to demolition it is recommended that representative samples of the building to be demolished be sampled and analyzed accordingly to determine if the construction debris would be considered a hazardous waste.

6.3 Polychlorinated Biphenyls (PCBs) Containing Materials

One (1) composite bulk samples of suspect caulking/sealant were collected. No suspect PCB containing materials were identified during this survey effort. Therefore, no remedial actions or special handling is required for potential PCBs containing caulking materials.

7.0 STATEMENT OF QUALIFICATIONS AND SIGNATURES

The information contained in this report is based on visual observations of the building and laboratory analytical data of the samples collected during the site visit(s). The survey was performed by Qualified Environmental Professional Mr. Frank Acciarito and Drew Cheskin. These individual(s) have specific qualifications based on education, training, and/or experience to assess a property of the nature, history, and setting of the Subject Properties. Certifications of the Environmental Professionals who performed this Asbestos Survey are provided in [Appendix C](#).

Langan Engineering, Environmental, Surveying, Landscape Architecture, and Geology, D.P.C.



Frank Acciarito
NYSDOL Asbestos Inspector
Cert# 23-6TS1N-SHAB
USEPA Lead Inspector
LBP-R-I220104-1



Drew Cheskin
NYSDOL Asbestos Inspector
Cert# 23-61X9V-SHAB
USEPA Lead Risk Assessor
LBP-R-11931-2

TABLES

Table 1A - SUMMARY OF ASBESTOS SURVEY FINDINGS
Rochambeau Alternative High School, 228 Fisher Ave, White Plains, NY

Material	Sample ID	Location	Survey Results			Estimated Quantity of ACM		Notes/Comments
ACM FINDINGS								
Interior								
Millboard Type 1	MB-1A/B	Rm 121	ACM	CHRY	50.00%	150	SF	Within wooden radiator enclosure
Millboard Type 2	MB-2A/B	Rm 305	ACM	CHRY	25.00%	30	SF	Within wooden radiator enclosure
Cove Base	BB-3A	Rm 116B (Kitchen Office) & 111A (Vestibule)	ACM Contaminated	---	---	90	SF	40 SF in Rm 116B
Cove Base Mastic			ACM	CHRY	2.50%			50 SF in Rm 111A
9" x 9" Floor Tile & Mastic	---	Rm 117 (Lounge)	ACM	---	---	1,300	SF	ACM per 2022 AHERA 9" x 9" Floor Tile & Mastic is underneath 12" x 12" Floor Tile & Mastic in Room 116, 116B & 111A
		Rm 116 (Kitchen)						
		Rm 116B (Pantry)						
		Rm 111A (Vestibule)						
Acoustical Wall Plaster	---	Auditorium	ACM	---	---	7,000	---	ACM per 2022 AHERA
Electrical component i.e., Wiring Insulation, etc;	---		Assumed ACM	---	---	---	---	No sampling due to inaccessibility and live electric
1' x 1' Ceiling Tiles	---		Assumed ACM	---	---	3,400	SF	No sampling due to inaccessibility
Door Cores	---		Throughout	Assumed ACM	---	---	34	DR
NON-ACM FINDINGS								
Throughout								
Red HVAC Caulk on Metal Plate	HVC-1	Throughout	Non ACM	---	---	---	---	---
Sink Undercoat (White)	SU-1	Throughout	Non ACM	---	---	---	---	---
Vibration Duct Cloth	VDC	Rm 117A	Non ACM	---	---	---	---	---
Gypsum Board	GYP-1	Throughout	Non ACM	---	---	---	---	---
Joint Compound	JC-1	Throughout	Non ACM	---	---	---	---	---
Plaster Ceiling Plenum	PLP-1	Throughout Cafetria Kitchen Area	Non ACM	---	---	---	---	---
2' x 2' Ceiling Tile	CT-1	Rm 201	Non ACM	---	---	---	---	---
Covebase & Assoc. Mastic 4" Burgundy	BB-1	Throughout	Non ACM	---	---	---	---	---
Covebase & Assoc. Mastic 6" Black	BB-2	Throughout	Non ACM	---	---	---	---	---
Covebase & Assoc. Mastic 4" D.Brown	BB-4	Throughout	Non ACM (Trace)	CHRY	<1.0%	---	---	---
Covebase & Assoc. Mastic 4" New Black	BB-5	Throughout	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic Marble Beige	VFT-1 VFTM-1	Throughout	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic Yellow	VFT-2 VFTM-2	Cafeteria & Rm 305	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile Burgundy	VFT-3	Cafeteria	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic White w/ Black Specks	VFT-4 VFTM-4	Rm. 122	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic White w/ Red Specks	VFT-5 VFTM-5	Throughout	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Mastic Yellow	VFTM-6	Rm 305	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic Tan Camo	VFT-7 VFTM-7	Rm. 307	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic (Under VFT-7)	VFT-8 VFTM-8		Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic Rose Marble	VFT-9 VFTM-9	Rm 313 & 313A	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic (Under VFTT-9)	VFT-10 VFTM-10	Rm 313	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic Tan Camo	VFT-11 VFTM-11	Rm 313C	Non ACM	---	---	---	---	---
12" x 12" Vinyl Floor Tile & Assoc. Mastic Gray w/ Red Streaks	VFT-12 VFTM-12	Rm 322	Non ACM	---	---	---	---	---

Table 1A - SUMMARY OF ASBESTOS SURVEY FINDINGS
Rochambeau Alternative High School, 228 Fisher Ave, White Plains, NY

Material	Sample ID	Location	Survey Results			Estimated Quantity of ACM		Notes/Comments
Ceiling Plaster, White Coat (throughout)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Ceiling Plaster, Brown Coat (throughout)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Wall Plaster, White Coat (throughout)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Wall Plaster, Brown Coat (throughout)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Ceiling Deck (gymnasium)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
1'x1' Ceiling Tile, Textured	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
1'x1' Ceiling Tile, Textured, Mastic	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Terrazzo Flooring	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Interior Brick Mortar	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Window Frame Caulk, Grey	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Brick Mortar	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
2'x4' Ceiling Tile, Patterned/Pinhole (old gymnasium)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
1'x1' Ceiling Tile, Pinhole (old gymnasium)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
1'x1' Ceiling Tile, Pinhole, Mastic (old gymnasium)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Brick Mortar (old gymnasium)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Interior Window Frame Caulk, Grey	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Interior Window Frame Caulk, Beige (to A/C units)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Stone Window Sill Caulk, Grey	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Brick Mortar (newer)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Wall Plaster, White Coat (auditorium stage)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Wall Plaster, Brown Coat (auditorium stage)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Pipe Joint to Fiberglass Pipe Insulation	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Interior Brick Mortar (foundation brick)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Pipe Gasket	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
1'x1' Ceiling Tile, Pinhole (cafeteria)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
1'x1' Ceiling Tile, Pinhole, Mastic (cafeteria)	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
1'x1' Ceiling Tile, Spline	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
CMU Mortar	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Caulking to Exterior Stone Window Detailing	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Putty to Main Entry Door Windows	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Door Frame Caulk, Tan	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Garage Door Frame Caulk, Grey	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Window Frame Caulk, Off-White	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Door Frame Caulk, Cream	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Window Frame Caulk, Tan	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
Exterior Louvre Caulk, Grey	---	---	---	---	---	---	---	2013 Louis Berger Project 3000828
2'x4' Large Gouged Ceiling Tile, White	---	---	---	---	---	---	---	2013 Louis Berger Project 3000865.00
2'x4' Fissured Ceiling Tile, White	---	---	---	---	---	---	---	2013 Louis Berger Project 3000865.00
1'x1' Gouged Ceiling Tile, Gray	---	---	---	---	---	---	---	2013 Louis Berger Project 3000865.00
2'x4' Gouged Ceiling Tile, White	---	---	---	---	---	---	---	2013 Louis Berger Project 3000865.00
2'x4' Striped Design Ceiling Tile, White	---	---	---	---	---	---	---	2013 Louis Berger Project 3000865.00
2'x4' Fissured/Pinhole Ceiling Tile, White	---	---	---	---	---	---	---	2013 Louis Berger Project 3000865.00

Table 1A - SUMMARY OF ASBESTOS SURVEY FINDINGS
Rochambeau Alternative High School, 228 Fisher Ave, White Plains, NY

Material	Sample ID	Location	Survey Results			Estimated Quantity of ACM		Notes/Comments
Skylight Flashing, Black (Roof "D")	---	---	---	---	---	---	---	2018 Louis Berger Project 2042261.035
Caulking on Cap & Skylight, Beige (Roof "D")	---	---	---	---	---	---	---	2018 Louis Berger Project 2042261.035
Screed, Gray (bottom roof layer) (Roof "D")	---	---	---	---	---	---	---	2018 Louis Berger Project 2042261.035
Tar on Foam Insulation, Black (Roof "D")	---	---	---	---	---	---	---	2018 Louis Berger Project 2042261.035
Perlite Insulation, Brown (Roof "D")	---	---	---	---	---	---	---	2018 Louis Berger Project 2042261.035
Roof Membrane, Black (top roof layer) (Roof "D")	---	---	---	---	---	---	---	2018 Louis Berger Project 2042261.035

- 1 A material with asbestos content greater than one percent (>1.0%) is considered as an asbestos-containing material (ACM). Concentrations in weight percent.
- 2 ND = "None Detected" – Asbestos not detected in sampled material.
- 3 CHRY = Chrysotile Asbestos
- 4 TBD = Quantity to be determined.

Table 2 - XRF SCREENING RESULTS
Rochambeau Alternative High School, 228 Fisher Ave, White Plains, NY

Reading ID #	Component	Substrate	Color	Test Location		Total Lead mg/cm ²	Results	Comments
				Floor	Area			
1	Calibration					1.10		
2	Calibration					1.10		---
3	Calibration					1.00		
356 East 78th Street								
4	Wall	CMU	Cream	Ground	Rm 101	-0.10	Negative	---
5	Window Frame	Wood	Brown	Ground	Rm 101	0.20	Negative	---
6	Window Stool	Wood	Brown	Ground	Rm 101	0.40	Negative	---
7	Door Frame	Metal	Brown	Ground	Rm 101	0.70	Negative	---
8	Wall	CMU	Yellow	Ground	Hall at Rm 101	0.00	Negative	---
9	Partition	Metal	Off-White	Ground	Rm 112	0.10	Negative	---
10	Partition	Gypsum	Off-White	Ground	Rm 112	0.10	Negative	---
11	Wall	Plaster	Off-White	Ground	Rm 114	0.10	Negative	---
12	Window Stool	Wood	Glaze	Ground	Rm 114	0.40	Negative	---
13	Ceiling Tile	Ceiling Tile	Yellow	Ground	Cafeteria	-0.10	Negative	---
14	Plenum	Plaster	White	Ground	Cafeteria	0.20	Negative	---
15	Wall	Brick	White	Ground	Cafeteria	0.30	Negative	---
16	Ceiling Radiator	Metal	Yellow	Ground	Cafeteria	0.50	Negative	---
17	Wall	Concrete	Cream	Ground	Kitchen	0.20	Negative	---
18	HVAC Ducts	Metal	Cream	Ground	Kitchen	0.10	Negative	---
19	Door Frame	Metal	Cream	Ground	Kitchen	0.40	Negative	---
20	Door	Wood	Cream	Ground	Kitchen	0.10	Negative	---
21	Door Frame	Wood	Cream	Ground	Kitchen	0.30	Negative	---
22	Wall	CMU	Cream	1	Rm 201	-0.10	Negative	---
23	Window Frame	Wood	Brown	1	Rm 201	0.20	Negative	---
24	Window Stool	Wood	Brown	1	Rm 201	0.40	Negative	---
25	Wall	Plaster	White	1	Auditorium	-0.10	Negative	---
26	Wall Panel	Wood	Glaze	1	Auditorium	0.00	Negative	---
27	Wall	Plaster	Off-White	2	Rm 304	0.30	Negative	---
28	Wall	Plaster	Off-White	2	Rm 305	0.10	Negative	---
29	Wall	Gypsum	Cream	2	Rm 306B	0.20	Negative	---
30	Calibration					1.10		
31	Calibration					1.00		---
32	Calibration					1.00		
33	Wall	Plaster	Cream	2	Rm 313	0.50	Negative	---
34	Radiator	Metal	Gray	2	Rm 313	0.30	Negative	---
35	Wall	Plaster	Cream	2	Rm 313C	0.10	Negative	---
36	Door	Wood	Gray	2	Rm 313C	4.90	Positive	---
37	Door Frame	Wood	Gray	2	Rm 313C	1.40	Positive	---
38	Wall	Plaster	Aqua	2	Rm 322	-0.10	Negative	---
39	Wall	Plaster	Blue	2	Rm 325	0.00	Negative	---
40	Window Stool	Stone	Tan	3	Gym	0.10	Negative	---
41	Window Grate	Metal	White	3	Gym	15.90	Positive	---
42	Door	Wood	White	Roof	Cupola Roof D	0.10	Negative	---
43	Door Frame	Metal	White	Roof	Cupola Roof D	26.70	Positive	---
44	Exterior Siding	Metal	White	Roof	Cupola Roof D	20.50	Positive	---
45	Interior Beams	Metal	Black	Roof	Cupola Roof D	3.60	Positive	---
46	Interior Ladder	Metal	Red	Roof	Cupola Roof D	6.70	Positive	---
47	Calibration					1.10		
48	Calibration					1.10		---
49	Calibration					1.10		

Note: Although Langan recognizes that the EPA definition of LBP is only applicable to certain residential and child-occupied structures, we are using the EPA LBP definition as a threshold for reporting. OSHA regulates disturbances and employee exposures to any detectable concentration of lead.

NEGATIVE	= Negative Lead Result
POSITIVE	= Positive for lead-based paint as defined under 40 CFR Part 745.

PLEASE SEE 2013 LOUIS BERGER REPORT, PROJECT 3000828 FOR ADDITIONAL XRF SCREENING RESULTS

Table 3 - SUMMARY OF CAULK SAMPLE PCB ANALYSES RESULTS
Rochambeau Alternative High School, 228 Fisher Ave, White Plains, NY

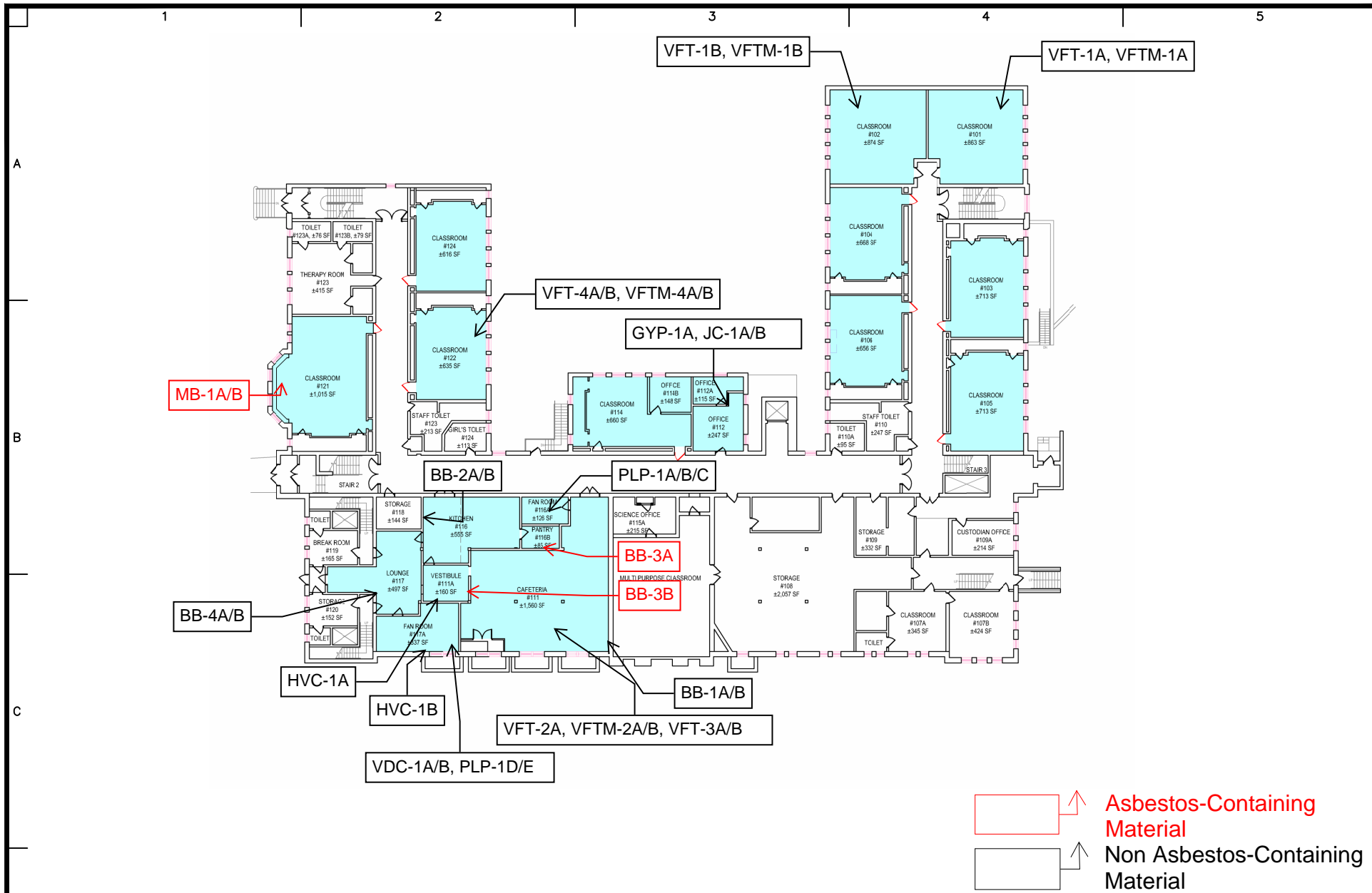
ND or <50000//50 [µg/Kg]//[PPM] ----- = Non-PCB

>50000//50 [µg/Kg]//[PPM] ----- = PCB Containing

Material	Sample ID #	Sample Location	Parameter	Results	Units	Reporting Level
Red HVAC Caulk on Metal Plate	HVC-1	Rms. 111A/117A/116	PCB-1016	0 // ND	[µg/Kg]//[PPM]	740 // 0.7
			PCB-1221	0 // ND	[µg/Kg]//[PPM]	740 // 0.7
			PCB-1232	0 // ND	[µg/Kg]//[PPM]	740 // 0.7
			PCB-1242	0 // ND	[µg/Kg]//[PPM]	740 // 0.7
			PCB-1248	0 // ND	[µg/Kg]//[PPM]	740 // 0.7
			PCB-1254	0 // ND	[µg/Kg]//[PPM]	740 // 0.7
			PCB-1260	0 // ND	[µg/Kg]//[PPM]	740 // 0.7
			PCB-1262	0 // ND	[µg/Kg]//[PPM]	740 // 0.7
			PCB-1268	0 // ND	[µg/Kg]//[PPM]	740 // 0.7

PLEASE SEE 2013 LOUIS BERGER REPORT, PROJECT 3000828 FOR ADDITIONAL PCB IN CAULK ANALYSIS RESULTS

FIGURES



GENERAL NOTES:

A. THIS PLAN IS PROVIDED TO SHOW APPROXIMATE SAMPLING LOCATIONS. THE ACTUAL LAYOUT OF THE BUILDING AND BUILDING EQUIPMENT MAY BE SLIGHTLY DIFFERENT THAN SHOWN.

LANGAN

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300 Kimball Drive
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NJ Certificate of Authorization No.24GA27996400

Project

**White Plains
Rochambeau
Alternative High School**

Drawing Title

**ASBESTOS SAMPLING
LOCATIONS
GROUND FLOOR**

Project No.

101061160

Date

7/17/2024

Drawn By

F. Acclarito

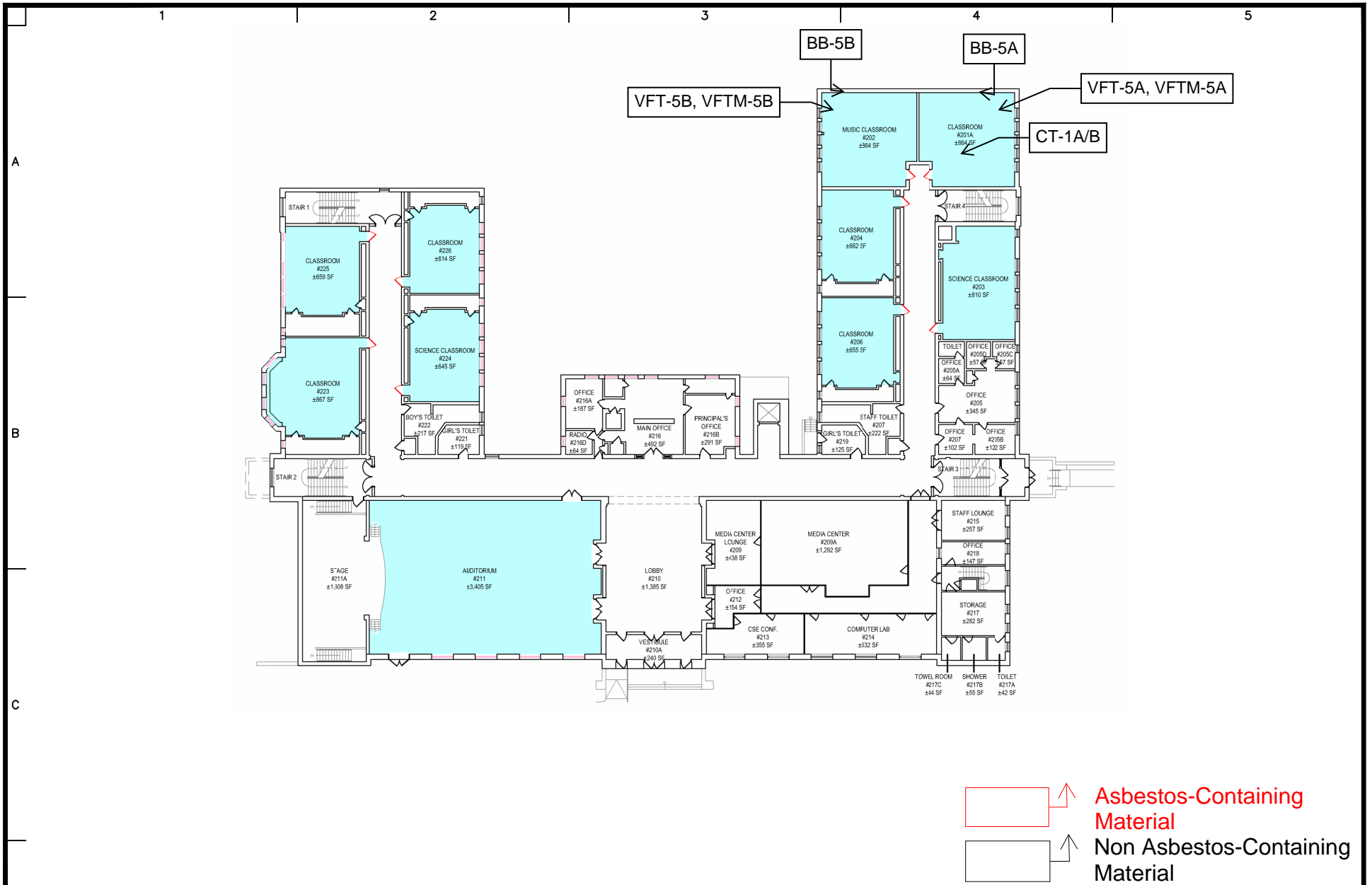
Checked By

D. Cheskin

Drawing No.

ASL-01

Sheet **1** of **3**



GENERAL NOTES:

A. THIS PLAN IS PROVIDED TO SHOW APPROXIMATE SAMPLING LOCATIONS. THE ACTUAL LAYOUT OF THE BUILDING AND BUILDING EQUIPMENT MAY BE SLIGHTLY DIFFERENT THAN SHOWN.

LANGAN

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NJ Certificate of Authorization No.24GA27996400

Project

**White Plains
Rochambeau
Alternative High School**

Drawing Title

**ASBESTOS SAMPLING
LOCATIONS
FIRST FLOOR**

Project No.

101061160

Date

7/17/2024

Drawn By

F. Acclarito

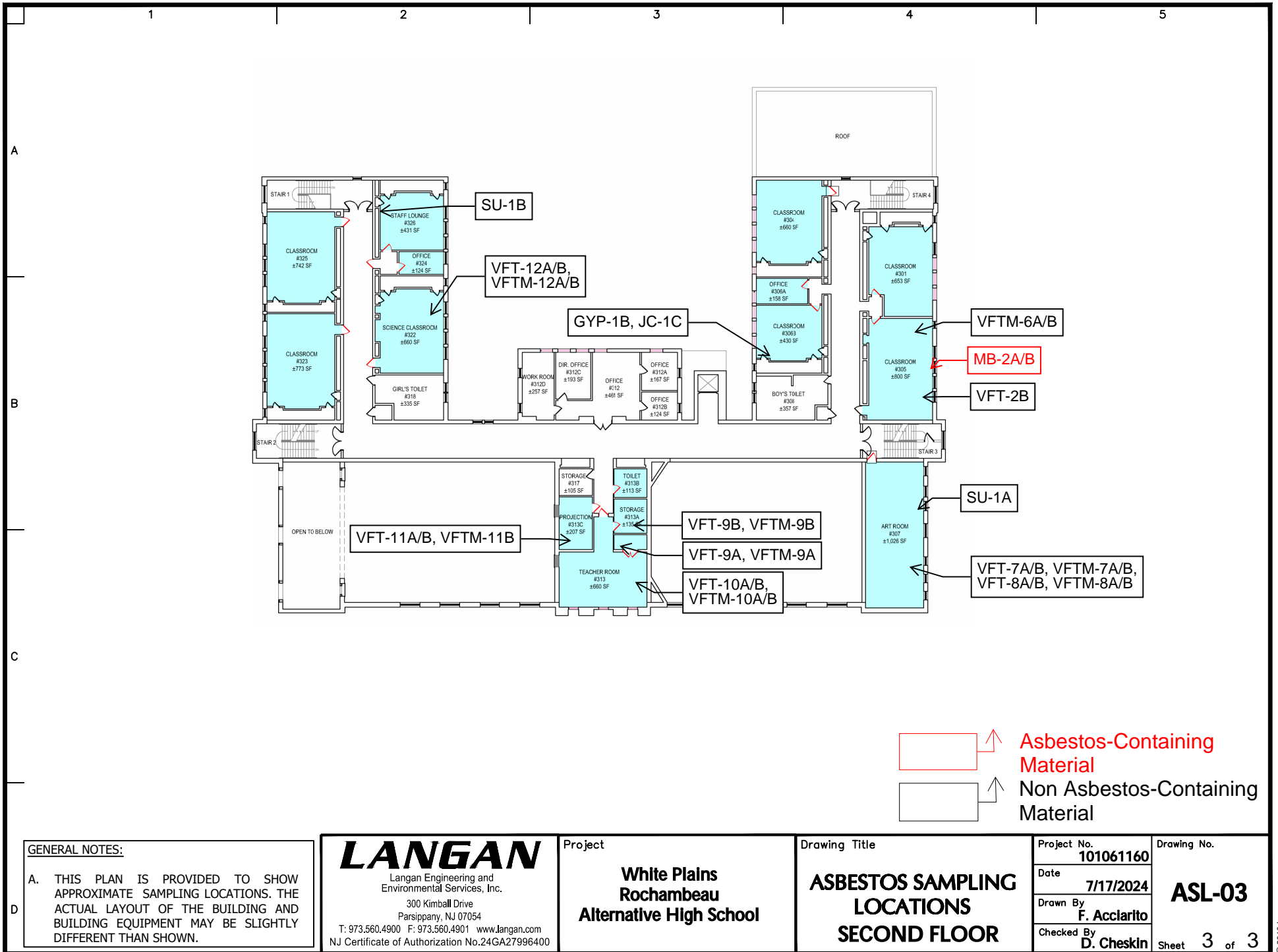
Checked By

D. Cheskin

Drawing No.

ASL-02

Sheet **2** of **3**



A P P E N D I X A

Laboratory Test Results and Chain of Custody Documentations (Asbestos)



Please Reply To:

AmeriSci New York

117 EAST 30TH ST.

NEW YORK, NY 10016

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LABORATORY ELECTRONIC TRANSMITTAL

To: Vijay Patel Langan Engineering & Environmental Service	From: Khaalid W. Perine
Fax #: (201) 794-7501	AmeriSci Job #: 224062131
Email: vpatel@langan.com, ddesai@langan.com, bfeury@langan.com, cnapolitano@langan.com, pdave@langan.com, dcheskin@langan.com, facciarito@langan.com	Subject: ELAP-PLM/TEM 5 day Results
	Client Project: 101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

Date: Tuesday, June 18, 2024

Time: 05:27:37

Comments:

Number of Pages: _____
(including cover sheet)

NOTE: Attached report is to be considered preliminary until final review with accompanying analysis summary letter is issued.

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PLM Bulk Asbestos Report

Langan Engineering & Environmental Services
Attn: Vijay Patel
300 Kimball Drive
4th Floor
Parsippany, NJ 07054

Date Received 06/13/24
Date Examined 06/17/24
ELAP # 11480
RE: 101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

AmeriSci Job # 224062131
P.O. #
Page 1 of 15

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
HVC-1A HVC1 Analyst Description: Red, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 11%	224062131-01 Location: Rm 111A - Red HVAC Caulk On Plate	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
HVC-1B HVC1 Analyst Description: Red, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 6.8%	224062131-02 Location: Rm 117A - Red HVAC Caulk On Plate	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
SU-1A SU1 Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 36.7%	224062131-03 Location: Rm 307 - Sink Undercoat (White)	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
SU-1B SU1 Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 40.3%	224062131-04 Location: Rm 326 - Sink Undercoat (White)	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
VDC-1A VDC1 Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.9%	224062131-05 Location: Rm 117A - Vibration Duct Cloth	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VDC-1B VDC1	224062131-06 Location: Rm 117A - Vibration Duct Cloth	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 4%			
MB-1A MB1	224062131-07 Location: Rm 121 - Millboard Type 1	Yes	50% (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Chrysotile 50.0 % Other Material: Cellulose 30%, Non-fibrous 20%			
MB-1B MB1	224062131-08 Location: Rm 121 - Millboard Type 1		NA/PS
Analyst Description: Bulk Material Asbestos Types: Other Material:			
MB-2A MB2	224062131-09 Location: Rm 305 - Millboard Type 2	Yes	25% (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Fibrous, Cementitious, Bulk Material Asbestos Types: Chrysotile 25.0 % Other Material: Non-fibrous 75%			
MB-2B MB2	224062131-10 Location: Rm 305 - Millboard Type 2		NA/PS
Analyst Description: Bulk Material Asbestos Types: Other Material:			
GYP-1A GYP1	224062131-11 Location: Rm 112 - Gypsum Board	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: Brown/White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
GYP-1B GYP1	224062131-12 Location: Rm 306 - Gypsum Board	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: Brown/White, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 20%, Non-fibrous 80%			
JC-1A JC1	224062131-13 Location: Rm 112 - Joint Compound	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JC-1B JC1	224062131-14 Location: Rm 112 - Joint Compound	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
JC-1C JC1	224062131-15 Location: Rm 306 - Joint Compound	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
PLP-1A PLP1	224062131-16 Location: Rm 116A - Plaster Ceiling Plenum	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
PLP-1B PLP1	224062131-17 Location: Rm 116A - Plaster Ceiling Plenum	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
PLP-1C PLP1	224062131-18 Location: Rm 116A - Plaster Ceiling Plenum	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
PLP-1D PLP1	224062131-19 Location: Rm 117A - Plaster Ceiling Plenum	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
PLP-1E PLP1	224062131-20 Location: Rm 117A - Plaster Ceiling Plenum	No	NAD (by NYS ELAP 198.1) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
CT-1A CT1	224062131-21 Location: Rm 201 - 2' X 2' Pinhole Ceiling Tile	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 36.2%			
CT-1B CT1	224062131-22 Location: Rm 201 - 2' X 2' Pinhole Ceiling Tile	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 54.5%			
BB-1A BB1	224062131-23L1 Location: Cafe 111 - Mastic & Cove Base 4" Burgundy - Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.9%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
BB-1A	224062131-23L2	No	NAD
BB1	Location: Cafe 111 - Mastic & Cove Base 4" Burgundy - Cove Base		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 7.8%			
BB-1B	224062131-24L1	No	NAD
BB1	Location: Cafe 111 - Mastic & Cove Base 4" Burgundy - Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.7%			
BB-1B	224062131-24L2	No	NAD
BB1	Location: Cafe 111 - Mastic & Cove Base 4" Burgundy - Cove Base		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 11.8%			
BB-2A	224062131-25L1	No	NAD
BB2	Location: Kitchen 116 - Mastic & Cove Base 6" Black - Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 4%			
BB-2A	224062131-25L2	No	NAD
BB2	Location: Kitchen 116 - Mastic & Cove Base 6" Black - Cove Base		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 44.1%			
BB-2B	224062131-26L1	No	NAD
BB2	Location: Kitchen 116 - Mastic & Cove Base 6" Black - Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.7%			

Client Name: Langan Engineering & Environmental Services

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
BB-2B BB2	224062131-26L2 Location: Kitchen 116 - Mastic & Cove Base 6" Black - Cove Base	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.4%			
BB-3A BB3	224062131-27L1 Location: Rm 116B - Mastic & Cove Base 4" Brown - Mastic	Yes	Trace (<0.25 % pc) ¹ (ELAP 400 PC) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile <0.25 % pc Other Material: Non-fibrous 25.1%			
BB-3A BB3	224062131-27L2 Location: Rm 116B - Mastic & Cove Base 4" Brown - Cove Base	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.2%			
BB-3B BB3	224062131-28L1 Location: Rm 111A - Mastic & Cove Base 4" Brown - Mastic	Yes	Trace (<0.25 % pc) ¹ (ELAP 400 PC) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile <0.25 % pc Other Material: Non-fibrous 19.7%			
BB-3B BB3	224062131-28L2 Location: Rm 111A - Mastic & Cove Base 4" Brown - Cove Base	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 4.6%			
BB-4A BB4	224062131-29L1 Location: Rm 117 - Mastic & Cove Base 4" D. Brown - Mastic	Yes	Trace (<0.25 % pc) ¹ (ELAP 400 PC) by Bo Sun on 06/17/24
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile <0.25 % pc Other Material: Non-fibrous 19.9%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
BB-4A	224062131-29L2	No	NAD
BB4	Location: Rm 117 - Mastic & Cove Base 4" D. Brown - Cove Base		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black/Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 4.9%			
BB-4B	224062131-30L1	No	NAD
BB4	Location: Rm 117 - Mastic & Cove Base 4" D. Brown - Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Dark Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 23.1%			
BB-4B	224062131-30L2	No	NAD
BB4	Location: Rm 117 - Mastic & Cove Base 4" D. Brown - Cove Base		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black/Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.8%			
BB-5A	224062131-31L1	No	NAD
BB5	Location: Rm 201 - Cove Base & Mastic - Cove Base		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.1%			
BB-5A	224062131-31L2	No	NAD
BB5	Location: Rm 201 - Cove Base & Mastic - Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 11.2%			
BB-5B	224062131-32L1	No	NAD
BB5	Location: Rm 202 - Cove Base & Mastic - Cove Base		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 0.5%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
BB-5B BB5	224062131-32L2 Location: Rm 202 - Cove Base & Mastic - Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 13.1%			
VFT-1A VFT1	224062131-33 Location: Rm 101 - 12" X 12" Vinyl Floor Tile Marble Beige	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Beige, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 15.5%			
VFT-1B VFT1	224062131-34 Location: Rm 102 - 12" X 12" Vinyl Floor Tile Marble Beige	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Beige, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 26.9%			
VFTM-1A VFTM1	224062131-35 Location: Rm 101 - 12" X 12" Vinyl Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 7.4%			
VFTM-1B VFTM1	224062131-36 Location: Rm 102 - 12" X 12" Vinyl Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 7.3%			
VFT-2A VFT2	224062131-37 Location: Cafe 111 - 12" X 12" Vinyl Floor Tile Yellow	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.4%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VFT-2B VFT2	224062131-38 Location: Rm 305 - 12" X 12" Vinyl Floor Tile Yellow	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.1%			
VFTM-2A VFTM2	224062131-39 Location: Cafe 111 - 12" X 12" Vinyl Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 13.4%			
VFTM-2B VFTM2	224062131-40 Location: Cafe 111 - 12" X 12" Vinyl Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 8.3%			
VFT-3A VFT3	224062131-41 Location: Cafe 111 - 12" Floor Tile Burgundy	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 30.3%			
VFT-3B VFT3	224062131-42 Location: Cafe 111 - 12" Floor Tile Burgundy	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.2%			
VFT-4A VFT4	224062131-43 Location: Rm 122 - 12" Floor Tile White W/ Black Specks	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.7%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VFT-4B	224062131-44	No	NAD
VFT4	Location: Rm 122 - 12" Floor Tile White W/ Black Specks		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 4.3%			
VFTM-4A	224062131-45	No	NAD
VFTM4	Location: Rm 122 - 12" Floor Tile Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 29.8%			
VFTM-4B	224062131-46	No	NAD
VFTM4	Location: Rm 122 - 12" Floor Tile Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 34.9%			
VFT-5A	224062131-47	No	NAD
VFT5	Location: Rm 201 - 12" Floor Tile White W/ Red Specks		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.9%			
VFT-5B	224062131-48	No	NAD
VFT5	Location: Rm 202 - 12" Floor Tile White W/ Red Specks		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.6%			
VFTM-5A	224062131-49	No	NAD
VFTM5	Location: Rm 201 - 12" Floor Tile Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 9.8%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VFTM-5B VFTM5	224062131-50 Location: Rm 202 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 9.5%			
VFTM-6A VFTM6	224062131-51 Location: Rm 305 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 13.9%			
VFTM-6B VFTM6	224062131-52 Location: Rm 305 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 11%			
VFT-7A VFT7	224062131-53 Location: Rm 307 - 12" Floor Tile Tan Camo	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 42.6%			
VFT-7B VFT7	224062131-54 Location: Rm 307 - 12" Floor Tile Tan Camo	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 43.5%			
VFTM-7A VFTM7	224062131-55 Location: Rm 307 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 9.8%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VFTM-7B VFTM7	224062131-56 Location: Rm 307 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 24.9%			
VFT-8A VFT8	224062131-57 Location: Rm 307 - 12" Floor Tile Original Under VFT-7	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.6%			
VFT-8B VFT8	224062131-58 Location: Rm 307 - 12" Floor Tile Original Under VFT-7	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.9%			
VFTM-8A VFTM8	224062131-59 Location: Rm 307 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.8%			
VFTM-8B VFTM8	224062131-60 Location: Rm 307 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.9%			
VFT-9A VFT9	224062131-61 Location: Rm 313 - 12" Floor Tile Rose Marble	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.5%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VFT-9B	224062131-62	No	NAD
VFT9	Location: Rm 313A - 12" Floor Tile Rose Marble		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.4%			
VFTM-9A	224062131-63	No	NAD
VFTM9	Location: Rm 313 - 12" Floor Tile Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 7.1%			
VFTM-9B	224062131-64	No	NAD
VFTM9	Location: Rm 313A - 12" Floor Tile Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 6.9%			
VFT-10A	224062131-65	No	NAD
VFT10	Location: Rm 313 - 12" Floor Tile Original Under VFT-9		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3.5%			
VFT-10B	224062131-66	No	NAD
VFT10	Location: Rm 313 - 12" Floor Tile Original Under VFT-9		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 3%			
VFTM-10A	224062131-67	No	NAD
VFTM10	Location: Rm 313 - 12" Floor Tile Mastic		(by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 0.5%			

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White
Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VFTM-10B VFTM10	224062131-68 Location: Rm 313 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 0.8%			
VFT-11A VFT11	224062131-69 Location: Rm 313C - 12" Floor Tile Red Marble	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White/Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.3%			
VFT-11B VFT11	224062131-70 Location: Rm 313C - 12" Floor Tile Red Marble	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: White/Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 2.6%			
VFTM-11A VFTM11	224062131-71 Location: Rm 313C - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 13.7%			
VFTM-11B VFTM11	224062131-72 Location: Rm 313C - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 9.2%			
VFT-12A VFT12	224062131-73 Location: Rm 322 - 12" Floor Tile Gray W/ Red Streaks	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 10%			

Client Name: Langan Engineering & Environmental Services

PLM Bulk Asbestos Report

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
VFT-12B VFT12	224062131-74 Location: Rm 322 - 12" Floor Tile Gray W/ Red Streaks	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 12%			
VFTM-12A VFTM12	224062131-75 Location: Rm 322 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 1.7%			
VFTM-12B VFTM12	224062131-76 Location: Rm 322 - 12" Floor Tile Mastic	No	NAD (by NYS ELAP 198.6) by Bo Sun on 06/17/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 0.5%			

Reporting Notes:

(1) Sample prepared for analysis by ELAP 198.6 method

Analyzed by: Bo Sun
Date: 6/17/2024

Reviewed by: Khaalid W. Perine



*NAD/NSD =no asbestos detected; NA =not analyzed; NA/PS=not analyzed/positive stop, (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; PLM Bulk Asbestos Analysis using Motic, Model BA310 Pol Scope, Microscope, Serial #: 1190000538, by Appd E to Subpt E, 40 CFR 763 quantified by either CVES or 400 pt ct as noted for each analysis (NVLAP 200546-0), ELAP PLM Method 198.1 for NY friable samples, which includes the identification and quantitation of vermiculite, or ELAP 198.6 for NOB samples, or EPA 400 pt ct by EPA 600-M4-82-020 (NY ELAP Lab 11480); Note:PLM is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non asbestos-containing in NY State (also see EPA Advisory for floor tile, FR 59,146,38970,8/1/94) National Institute of Standards and Technology Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the lab.This PLM report relates ONLY to the items tested. RI Cert AAL-094, CT Cert PH-0186, Mass Cert AA000054, NJ Lab ID #NY031.

_____END OF REPORT_____

Client Name: Langan Engineering & Environmental Services

Table I
Summary of Bulk Asbestos Analysis Results

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
01	HVC-1A	HVC1	0.235	57.9	31.2	11.0	NAD	NAD
Location: Rm 111A - Red HVAC Caulk On Plate								
02	HVC-1B	HVC1	0.268	58.3	34.9	6.8	NAD	NAD
Location: Rm 117A - Red HVAC Caulk On Plate								
03	SU-1A	SU1	0.174	28.0	35.3	36.7	NAD	NAD
Location: Rm 307 - Sink Undercoat (White)								
04	SU-1B	SU1	0.219	34.5	25.2	40.3	NAD	NAD
Location: Rm 326 - Sink Undercoat (White)								
05	VDC-1A	VDC1	0.353	90.7	5.4	3.9	NAD	NAD
Location: Rm 117A - Vibration Duct Cloth								
06	VDC-1B	VDC1	0.355	75.7	20.3	4.0	NAD	NAD
Location: Rm 117A - Vibration Duct Cloth								
07	MB-1A	MB1	----	----	----	----	Chrysotile 50.0	NA
Location: Rm 121 - Millboard Type 1								
08	MB-1B	MB1	----	----	----	----	NA/PS	NA
Location: Rm 121 - Millboard Type 1								
09	MB-2A	MB2	----	----	----	----	Chrysotile 25.0	NA
Location: Rm 305 - Millboard Type 2								
10	MB-2B	MB2	----	----	----	----	NA/PS	NA
Location: Rm 305 - Millboard Type 2								
11	GYP-1A	GYP1	----	----	----	----	NAD	NA
Location: Rm 112 - Gypsum Board								
12	GYP-1B	GYP1	----	----	----	----	NAD	NA
Location: Rm 306 - Gypsum Board								
13	JC-1A	JC1	----	----	----	----	NAD	NA
Location: Rm 112 - Joint Compound								
14	JC-1B	JC1	----	----	----	----	NAD	NA
Location: Rm 112 - Joint Compound								
15	JC-1C	JC1	----	----	----	----	NAD	NA
Location: Rm 306 - Joint Compound								
16	PLP-1A	PLP1	----	----	----	----	NAD	NA
Location: Rm 116A - Plaster Ceiling Plenum								

Client Name: Langan Engineering & Environmental Services

Table I
Summary of Bulk Asbestos Analysis Results

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
17	PLP-1B	PLP1	----	----	----	----	NAD	NA
Location: Rm 116A - Plaster Ceiling Plenum								
18	PLP-1C	PLP1	----	----	----	----	NAD	NA
Location: Rm 116A - Plaster Ceiling Plenum								
19	PLP-1D	PLP1	----	----	----	----	NAD	NA
Location: Rm 117A - Plaster Ceiling Plenum								
20	PLP-1E	PLP1	----	----	----	----	NAD	NA
Location: Rm 117A - Plaster Ceiling Plenum								
21	CT-1A	CT1	0.283	17.9	45.9	36.2	NAD	NAD
Location: Rm 201 - 2' X 2' Pinhole Ceiling Tile								
22	CT-1B	CT1	0.260	16.1	29.5	54.5	NAD	NAD
Location: Rm 201 - 2' X 2' Pinhole Ceiling Tile								
23L1	BB-1A	BB1	0.206	50.2	46.8	2.9	NAD	NAD
Location: Cafe 111 - Mastic & Cove Base 4" Burgundy - Mastic								
23L2	BB-1A	BB1	0.185	54.1	38.1	7.8	NAD	NAD
Location: Cafe 111 - Mastic & Cove Base 4" Burgundy - Cove Base								
24L1	BB-1B	BB1	0.170	51.2	47.1	1.7	NAD	NAD
Location: Cafe 111 - Mastic & Cove Base 4" Burgundy - Mastic								
24L2	BB-1B	BB1	0.194	59.8	28.4	11.8	NAD	NAD
Location: Cafe 111 - Mastic & Cove Base 4" Burgundy - Cove Base								
25L1	BB-2A	BB2	0.241	52.9	43.1	4.0	NAD	NAD
Location: Kitchen 116 - Mastic & Cove Base 6" Black - Mastic								
25L2	BB-2A	BB2	0.494	23.5	32.4	44.1	NAD	NAD
Location: Kitchen 116 - Mastic & Cove Base 6" Black - Cove Base								
26L1	BB-2B	BB2	0.262	31.9	66.4	1.7	NAD	NAD
Location: Kitchen 116 - Mastic & Cove Base 6" Black - Mastic								
26L2	BB-2B	BB2	0.388	21.7	75.9	2.4	NAD	NAD
Location: Kitchen 116 - Mastic & Cove Base 6" Black - Cove Base								
27L1	BB-3A	BB3	0.406	50.0	25.0	22.6	Chrysotile <0.25	Chrysotile 2.5
Location: Rm 116B - Mastic & Cove Base 4" Brown - Mastic								
27L2	BB-3A	BB3	0.207	66.3	30.6	3.2	NAD	NAD
Location: Rm 116B - Mastic & Cove Base 4" Brown - Cove Base								

See Reporting notes on last page

Client Name: Langan Engineering & Environmental Services

Table I
Summary of Bulk Asbestos Analysis Results

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
28L1	BB-3B	BB3	0.210	51.5	28.8	19.7	Chrysotile <0.25	N/A/PS
Location: Rm 111A - Mastic & Cove Base 4" Brown - Mastic								
28L2	BB-3B	BB3	0.200	63.9	31.5	4.6	NAD	NAD
Location: Rm 111A - Mastic & Cove Base 4" Brown - Cove Base								
29L1	BB-4A	BB4	0.246	67.6	12.5	19.7	Chrysotile <0.25	Chrysotile <1.0
Location: Rm 117 - Mastic & Cove Base 4" D. Brown - Mastic								
29L2	BB-4A	BB4	0.116	55.9	39.2	4.9	NAD	NAD
Location: Rm 117 - Mastic & Cove Base 4" D. Brown - Cove Base								
30L1	BB-4B	BB4	0.246	66.2	10.7	23.1	NAD	NAD
Location: Rm 117 - Mastic & Cove Base 4" D. Brown - Mastic								
30L2	BB-4B	BB4	0.183	54.7	41.5	3.8	NAD	NAD
Location: Rm 117 - Mastic & Cove Base 4" D. Brown - Cove Base								
31L1	BB-5A	BB5	0.238	45.7	52.2	2.1	NAD	NAD
Location: Rm 201 - Cove Base & Mastic - Cove Base								
31L2	BB-5A	BB5	0.249	35.6	53.2	11.2	NAD	NAD
Location: Rm 201 - Cove Base & Mastic - Mastic								
32L1	BB-5B	BB5	0.222	41.1	58.4	0.5	NAD	NAD
Location: Rm 202 - Cove Base & Mastic - Cove Base								
32L2	BB-5B	BB5	0.293	30.3	56.6	13.1	NAD	NAD
Location: Rm 202 - Cove Base & Mastic - Mastic								
33	VFT-1A	VFT1	0.296	19.6	64.9	15.5	NAD	NAD
Location: Rm 101 - 12" X 12" Vinyl Floor Tile Marble Beige								
34	VFT-1B	VFT1	0.335	24.7	48.4	26.9	NAD	NAD
Location: Rm 102 - 12" X 12" Vinyl Floor Tile Marble Beige								
35	VFTM-1A	VFTM1	0.228	69.6	23.0	7.4	NAD	NAD
Location: Rm 101 - 12" X 12" Vinyl Floor Tile Mastic								
36	VFTM-1B	VFTM1	0.133	74.8	17.9	7.3	NAD	NAD
Location: Rm 102 - 12" X 12" Vinyl Floor Tile Mastic								
37	VFT-2A	VFT2	0.262	13.5	83.2	3.4	NAD	NAD
Location: Cafe 111 - 12" X 12" Vinyl Floor Tile Yellow								
38	VFT-2B	VFT2	0.300	14.3	84.6	1.1	NAD	NAD
Location: Rm 305 - 12" X 12" Vinyl Floor Tile Yellow								

Client Name: Langan Engineering & Environmental Services

Table I
Summary of Bulk Asbestos Analysis Results

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
39	VFTM-2A	VFTM2	0.084	31.3	55.3	13.4	NAD	NAD
Location: Cafe 111 - 12" X 12" Vinyl Floor Tile Mastic								
40	VFTM-2B	VFTM2	0.135	20.8	70.9	8.3	NAD	NAD
Location: Cafe 111 - 12" X 12" Vinyl Floor Tile Mastic								
41	VFT-3A	VFT3	0.349	13.6	56.1	30.3	NAD	NAD
Location: Cafe 111 - 12" Floor Tile Burgundy								
42	VFT-3B	VFT3	0.345	12.7	85.0	2.2	NAD	NAD
Location: Cafe 111 - 12" Floor Tile Burgundy								
43	VFT-4A	VFT4	0.276	15.6	80.7	3.7	NAD	NAD
Location: Rm 122 - 12" Floor Tile White W/ Black Specks								
44	VFT-4B	VFT4	0.294	15.1	80.7	4.3	NAD	NAD
Location: Rm 122 - 12" Floor Tile White W/ Black Specks								
45	VFTM-4A	VFTM4	0.077	45.2	25.0	29.8	NAD	NAD
Location: Rm 122 - 12" Floor Tile Mastic								
46	VFTM-4B	VFTM4	0.052	39.7	25.4	34.9	NAD	NAD
Location: Rm 122 - 12" Floor Tile Mastic								
47	VFT-5A	VFT5	0.287	27.9	70.2	1.9	NAD	NAD
Location: Rm 201 - 12" Floor Tile White W/ Red Specks								
48	VFT-5B	VFT5	0.300	27.6	70.8	1.6	NAD	NAD
Location: Rm 202 - 12" Floor Tile White W/ Red Specks								
49	VFTM-5A	VFTM5	0.147	30.4	59.7	9.8	NAD	NAD
Location: Rm 201 - 12" Floor Tile Mastic								
50	VFTM-5B	VFTM5	0.258	67.5	23.0	9.5	NAD	NAD
Location: Rm 202 - 12" Floor Tile Mastic								
51	VFTM-6A	VFTM6	0.147	45.9	40.2	13.9	NAD	NAD
Location: Rm 305 - 12" Floor Tile Mastic								
52	VFTM-6B	VFTM6	0.134	66.1	22.9	11.0	NAD	NAD
Location: Rm 305 - 12" Floor Tile Mastic								
53	VFT-7A	VFT7	0.309	18.7	38.8	42.6	NAD	NAD
Location: Rm 307 - 12" Floor Tile Tan Camo								
54	VFT-7B	VFT7	0.255	18.8	37.7	43.5	NAD	NAD
Location: Rm 307 - 12" Floor Tile Tan Camo								

See Reporting notes on last page

Client Name: Langan Engineering & Environmental Services

Table I
Summary of Bulk Asbestos Analysis Results

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
55	VFTM-7A	VFTM7	0.086	75.7	14.5	9.8	NAD	NAD
	Location: Rm 307 - 12" Floor Tile Mastic							
56	VFTM-7B	VFTM7	0.156	57.5	17.6	24.9	NAD	NAD
	Location: Rm 307 - 12" Floor Tile Mastic							
57	VFT-8A	VFT8	0.281	12.6	84.8	2.6	NAD	NAD
	Location: Rm 307 - 12" Floor Tile Original Under VFT-7							
58	VFT-8B	VFT8	0.178	14.4	81.7	3.9	NAD	NAD
	Location: Rm 307 - 12" Floor Tile Original Under VFT-7							
59	VFTM-8A	VFTM8	0.148	52.7	45.5	1.8	NAD	NAD
	Location: Rm 307 - 12" Floor Tile Mastic							
60	VFTM-8B	VFTM8	0.115	46.1	51.0	2.9	NAD	NAD
	Location: Rm 307 - 12" Floor Tile Mastic							
61	VFT-9A	VFT9	0.283	13.3	83.2	3.5	NAD	NAD
	Location: Rm 313 - 12" Floor Tile Rose Marble							
62	VFT-9B	VFT9	0.227	14.2	82.4	3.4	NAD	NAD
	Location: Rm 313A - 12" Floor Tile Rose Marble							
63	VFTM-9A	VFTM9	0.304	58.6	34.3	7.1	NAD	NAD
	Location: Rm 313 - 12" Floor Tile Mastic							
64	VFTM-9B	VFTM9	0.232	62.8	30.3	6.9	NAD	NAD
	Location: Rm 313A - 12" Floor Tile Mastic							
65	VFT-10A	VFT10	0.272	13.3	83.1	3.5	NAD	NAD
	Location: Rm 313 - 12" Floor Tile Original Under VFT-9							
66	VFT-10B	VFT10	0.232	15.3	81.7	3.0	NAD	NAD
	Location: Rm 313 - 12" Floor Tile Original Under VFT-9							
67	VFTM-10A	VFTM10	0.304	95.5	4.0	0.5	NAD	NAD
	Location: Rm 313 - 12" Floor Tile Mastic							
68	VFTM-10B	VFTM10	0.224	97.7	1.6	0.8	NAD	NAD
	Location: Rm 313 - 12" Floor Tile Mastic							
69	VFT-11A	VFT11	0.268	26.6	72.2	1.3	NAD	NAD
	Location: Rm 313C - 12" Floor Tile Red Marble							
70	VFT-11B	VFT11	0.309	27.5	69.9	2.6	NAD	NAD
	Location: Rm 313C - 12" Floor Tile Red Marble							

See Reporting notes on last page

Client Name: Langan Engineering & Environmental Services

Table I
Summary of Bulk Asbestos Analysis Results

101061160; Rochambeau AH, H.S.; 228 Fisher Ave, White Plains, NY 10606

AmeriSci Sample #	Client Sample#	HG Area	Sample Weight (gram)	Heat Sensitive Organic %	Acid Soluble Inorganic %	Insoluble Non-Asbestos Inorganic %	** Asbestos % by PLM/DS	** Asbestos % by TEM
71	VFTM-11A	VFTM11	0.312	50.0	36.3	13.7	NAD	NAD
Location: Rm 313C - 12" Floor Tile Mastic								
72	VFTM-11B	VFTM11	0.226	52.3	38.5	9.2	NAD	NAD
Location: Rm 313C - 12" Floor Tile Mastic								
73	VFT-12A	VFT12	0.255	22.4	67.6	10.0	NAD	NAD
Location: Rm 322 - 12" Floor Tile Gray W/ Red Streaks								
74	VFT-12B	VFT12	0.278	24.4	63.6	12.0	NAD	NAD
Location: Rm 322 - 12" Floor Tile Gray W/ Red Streaks								
75	VFTM-12A	VFTM12	0.281	97.5	0.8	1.7	NAD	NAD
Location: Rm 322 - 12" Floor Tile Mastic								
76	VFTM-12B	VFTM12	0.277	97.4	2.2	0.5	NAD	NAD
Location: Rm 322 - 12" Floor Tile Mastic								

Analyzed by: Khaalid W. Perine

Date: 6/17/2024



Reviewed by: Khaalid W. Perine



**Quantitative Analysis (Semi/Full); Bulk Asbestos Analysis - PLM by Appd E to Subpt E, 40 CFR 763 or NYSDOH ELAP 198.1 for New York friable samples or NYSDOH ELAP 198.6 for New York NOB samples; TEM (Semi/Full) by EPA 600/R-93/116 (or NYSDOH ELAP 198.4; for New York samples). Analysis using Hitachi, Model H7000-Noran 7 System, Microscope, Serial #: 747-05-06. NAD = no asbestos detected during a quantitative analysis; NA = not analyzed; Trace = <1%; (SOF-V) = Sprayed On Fireproofing containing Vermiculite; (SM-V) = Surfacing Material containing Vermiculite; Quantitation for beginning weights of <0.1 grams should be considered as qualitative only; Qualitative Analysis: Asbestos analysis results of "Present" or "NVA = No Visible Asbestos" represents results for Qualitative PLM or TEM Analysis only (no accreditation coverage available from any regulatory agency for qualitative analyses): NVLAP (PLM) 200546-0, NYSDOH ELAP Lab 11480, NJ Lab ID #NY031.

Warning Note: PLM limitation, only TEM will resolve fibers <0.25 micrometers in diameter. TEM bulk analysis is representative of the fine grained matrix material and may not be representative of non-uniformly dispersed debris for which PLM evaluation is recommended (i.e. soils and other heterogenous materials).

LANGAN

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CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Page 1 of 8

Project Name: <u>Rochambeau Alt. H.S.</u>				Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB		Results
Address: <u>Rochambeau Alt. H.S.</u>		Auth. By: _____		PLM	PLM-NOB	TEM	AAS	TCLP	EPA Method 8082		
<u>228 Fisher Ave, White Plains, NY</u>		Phone No: <u>973.560.4983</u>									
Langan Job No.: <u>101061160</u>		Sampling Date: <u>6-11-24</u>									
Sampled By/License #: <u>Frank Acciardo 23-6TJ2N-5HAB</u>											
Sample #	Sample ID	Description of Composite Sample	Sample Location								
	HVC-1A	Red HVAC Caulk on Plate	Rm 111A		/	/					
	HVC-1B	↓ ↓	Rm 117A		/	/					
	SU-1A	Sink undercoat (white)	Rm 307	/							
	SU-1B	↓ ↓	Rm 326	/							
	VDC-1A	Vibration Duct Cloth	Rm 117A		/	/					
	VDC-1B	↓ ↓	↓		/	/					
	MB-1A	Mullboard Type 1	Rm 121	/							
	MB-1B	↓	↓	/							
	MB-2A	Type 2	Rm 305	/							
	MB-2B	↓ ↓	↓	/							
Total No. of Samples: <u>10</u>				Turnaround Request:				RUSH 12 hours 24 hours 48 hours 72 hours 5 days			
Laboratory Instructions: <u>Please e-mail results to Dchoekin@langan.com, Facciardo@langan.com, Cnapolitano@langan.com</u>											
Relinquished By: _____		Date: _____		Time: _____		Received by: <u>[Signature]</u>		Date: <u>6/13/24</u>		Time: <u>1050</u>	
Company: LANGAN				Company: <u>AmeriSci</u>							

Laboratory Name: _____

LANGAN

300 Kimball Drive
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Fax: 973-560-4901

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Page 2 of 8

Project Name: Rochambeau AHS				Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB		Results
Address: 228 Fisher Ave White Plains, NY 10610		Auth. By:		973.560.4983							
Langan Job No.: 101061160		Phone No:									
Sampled By/License #: Frank Acciarito 23-GTJN-SHAB		Sampling Date: 6-11-24									
Sample #	Sample ID	Description of Composite Sample	Sample Location	PLM	PLM-NOB	TEM	AAS	TCLP	EPA Method 8082		
	GYP-1A	Gypsum Board	Rm 112	/							
	GYP-1B	↓	Rm 306	/							
	JC-1A	Joint Compound	Rm 112	/							
	JC-1B	↓		/							
	JC-1C	↓	Rm 306	/							
	PLP-1A	Plaster Ceiling Plenum	Rm 116A	/							
	↓ -1B	↓	↓	/							
	↓ -1C	↓	↓	/							
	↓ -1D	↓	Rm 117A	/							
	✓ -1E	↓	↓	/							
Total No. of Samples: 10				Turnaround Request:							
				RUSH	12 hours	24 hours	48 hours	72 hours	5 days		
Laboratory Instructions: Please e-mail results to										X	
Relinquished By:		Date: 6-12-24		Received by:		Date: 6/13/24		Time: 1050			
Company: LANGAN				Company: Amea' Sci							

Laboratory Name:

LANGAN

300 Kimball Drive
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CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Page 3 of 8

Project Name: Rochambeau AHS				Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB	Results													
Address: 228 Fisher Ave White Plains, NY 106061160		Auth. By:		Phone No: 973.560.4983		PLM	PLM-NOB	TEM	AAS		TCLP	EPA Method 8082											
Langan Job No.:		Sampling Date: 6-11-24																					
Sampled By/License #:		Frank Acciarito 23-GT52N-SHAB																					
Sample #	Sample ID	Description of Composite Sample	Sample Location																				
	CT-1A	2'x2' Pinhole Ceiling Tile	Rm 201		/	/																	
	CT-1B	↓			/	/																	
	BB-1A	Mastic & Covebase 4" Burgundy	Cafe 111		/	/																	
	-1B	↓	↓		/	/																	
	-2A	6" Black	Kitchen 116		/	/																	
	-2B	↓	↓		/	/																	
	-3A	4" Brown	Rm 116B		/	/																	
	-3B		Rm 111A		/	/																	
	-4A	4" D. Brown	Rm 117		/	/				224062181													
	↓ -4B	↓	↓		/	/																	
Total No. of Samples: 10				Turnaround Request:		<table border="1"><tr><td>RUSH</td><td>12 hours</td><td>24 hours</td><td>48 hours</td><td>72 hours</td><td>5 days</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td><input checked="" type="checkbox"/></td></tr></table>						RUSH	12 hours	24 hours	48 hours	72 hours	5 days						<input checked="" type="checkbox"/>
RUSH	12 hours	24 hours	48 hours	72 hours	5 days																		
					<input checked="" type="checkbox"/>																		
Laboratory Instructions:		Please e-mail results to																					
Relinquished By:		Date: 6-12-24		Time:		Received by:		Date: 6/13/24		Time: 1050													
Company: LANGAN		Company: AmeriSci																					



Laboratory Name:

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CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Page 4 of 8

Project Name: <u>Rochambeau AHS</u>				Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB		Results												
Address: <u>228 Fisher Ave</u>		Auth. By:		<div>PLM</div> <div>PLM-NOB</div> <div>TEM</div>			<div>AAS</div> <div>TCLP</div>		<div>EPA Method 8082</div>														
<u>White Plains, NY</u>		Phone No: <u>973.560.4983</u>																					
Langan Job No.: <u>101061160</u>		Sampling Date: <u>6-11-24</u>																					
Sampled By/License #: <u>Frank Accarito 23-GT57N-SHAB</u>																							
Sample #	Sample ID	Description of Composite Sample	Sample Location																				
	BB-SA	Corebase + Mastic 4" New Black	Rm 201		/	/																	
	BB-SB	↓	Rm 202		/	/																	
	VFT-1A	12"x12" Vinyl Floor Tile Marble Berge	Rm 101		↓	↓																	
	↓ - 1B	↓	Rm 102																				
	VFTM-1A	Mastic	Rm 101																				
	↓ - 1B	↓	Rm 102																				
	VFT-2A	Yellow	Cafe III																				
	↓ - 2B	↓	Cafe Rm 305																				
	VFTM-2A	Mastic	Cafe III								224062131												
	↓ - 2B	↓	↓				↓	↓															
Total No. of Samples: <u>10</u>				Turnaround Request:				<table border="1"><tr><td>RUSH</td><td>12 hours</td><td>24 hours</td><td>48 hours</td><td>72 hours</td><td>5 days</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td><input checked="" type="checkbox"/></td></tr></table>				RUSH	12 hours	24 hours	48 hours	72 hours	5 days						<input checked="" type="checkbox"/>
RUSH	12 hours	24 hours	48 hours	72 hours	5 days																		
					<input checked="" type="checkbox"/>																		
Laboratory Instructions:		Please e-mail results to																					
Relinquished By:		Date:		Time:		Received by:		Date:		Time:													
		<u>6-12-24</u>						<u>6/13/24</u>		<u>1050</u>													
Company: LANGAN		Company: <u>Ameri'Sco</u>																					


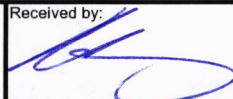
Laboratory Name:

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CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Page 5 of 8

Project Name: Rochambeau AHS				Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB	Results		
Address: 228 Fisher Ave White Plains NY		Auth. By:		Phone No: 973.560.4983		PLM	PLM-NOB	TEM	AAS		TCLP	EPA Method 8082
Langan Job No.: 101061160		Phone No:		Sampling Date: 6-11-24								
Sampled By/License #: Frank Acciarito 23-GT57N-SHAB												
Sample #	Sample ID	Description of Composite Sample		Sample Location								
	VFT-3A	12" Floor Tile Burgundy		Cafe 111								
	VFT-3B	↓		↓								
	VFT-4A	White w/Black specks		Rm 122								
	VFT-4B	↓		↓								
	VFTM-4A	Mastic		↓								
	VFTM-4B	↓		↓								
	VFT-5A	White w/red specks		Rm 201								
	VFT-5B	↓		Rm 202								
	VFTM-5A	Mastic		Rm 201								
	VFTM-5B	↓		Rm 202								
Total No. of Samples: 10						Turnaround Request:						
Laboratory Instructions: Please e-mail results to						RUSH	12 hours	24 hours	48 hours	72 hours	5 days	
											X	
Relinquished By:				Date: 6-12-24	Time:	Received by: 		Date: 6/13/24	Time: 1050			
Company: LANGAN						Company: AmeriSci						


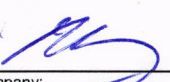
Laboratory Name:

LANGAN

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Page 6 of 8

Project Name: <u>Rochambeau HTS</u>				Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB		Results
Address: <u>228 Fisher Ave</u>		Auth. By:		<div>PLM</div> <div>PLM-NOB</div> <div>TEM</div>			<div>AAS</div> <div>TCLP</div>		<div>EPA Method 8082</div>		
<u>White Plains, NY</u>		Phone No: <u>973.560.4983</u>									
Langan Job No.: <u>101061160</u>		Sampling Date: <u>6-11-24</u>									
Sampled By/License #: <u>Frank Acciaro 23-GT57N-SHAB</u>											
Sample #	Sample ID	Description of Composite Sample		Sample Location							
	VFTM-6A	12" Floor Tile Mastic		Rm 305							
	↓ -6B	↓		↓							
	VFT-7A	Tan Camo		Rm 307							
	VFT-7B	↓		↓							
	VFTM-7A	Mastic		↓							
	↓ -7B	↓		↓							
	VFT-8A	Original under VFT-7		↓							
	↓ -8B	↓		↓							
	VFTM-8A	Mastic		↓							
	↓ -8B	↓		↓							
Total No. of Samples: <u>10</u>						Turnaround Request:					
						RUSH	12 hours	24 hours	48 hours	72 hours	5 days
											<u>X</u>
Laboratory Instructions: Please e-mail results to											
Relinquished By:				Date:	<u>6-12-24</u>	Received by:				Date:	<u>6/13/24</u>
Company: LANGAN						Company:		<u>AmeriSci</u>		Time: <u>1050</u>	


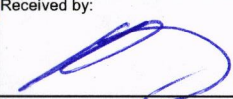
Laboratory Name:

LANGAN

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST



Page 7 of 8

Project Name: <u>Rochamboro HS</u>				Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB		Results												
Address: <u>228 Fisher Ave</u>		Auth. By:		<div>PLM</div> <div>PLM-NOB</div> <div>TEM</div>			<div>AAS</div> <div>TCLP</div>		<div>EPA Method 8082</div>														
<u>White Plains, NY</u>		Phone No: <u>973.560.4983</u>																					
<u>101061160</u>		Sampling Date: <u>6-11-24</u>																					
Langan Job No.:		Sampled By/License #: <u>Frank Acciardo 23-GTSIN-SHAG</u>																					
Sample #	Sample ID	Description of Composite Sample		Sample Location																			
	VFT-9A	12" Floor Tile Rose Marble		Rm 313																			
	↓ -9B	↓		Rm 313A																			
	VFTM-9A	Mastic		Rm 313																			
	↓ -9B	↓		Rm 313A																			
	VFT-10A	Original under VFT-9		Rm 313																			
	VFT-10B	↓		↓																			
	VFTM-10A	Mastic		↓																			
	↓ -10B	↓		↓																			
	VFT-11A	Red Marble		Rm 313C																			
	↓ -11B	↓		↓																			
Total No. of Samples: <u>10</u>				Turnaround Request:				<table border="1"><tr><td>RUSH</td><td>12 hours</td><td>24 hours</td><td>48 hours</td><td>72 hours</td><td>5 days</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td>X</td></tr></table>				RUSH	12 hours	24 hours	48 hours	72 hours	5 days						X
RUSH	12 hours	24 hours	48 hours	72 hours	5 days																		
					X																		
Laboratory Instructions:		Please e-mail results to																					
Relinquished By: 		Date: <u>6-12-24</u>		Time:		Received by: 		Date: <u>6/13/24</u>		Time: <u>1050</u>													
Company: LANGAN				Company: <u>AmeriSci</u>																			

Laboratory Name:

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

Page 8 of 8

Project Name: Rochambeau AHS							Analysis Requested for Asbestos			Analysis Requested for Lead		Analysis Requested for PCB								
Address:		228 Fisher Ave White Plains, NY		Auth. By:																
		101061160		Phone No:		973.560.4983														
Langan Job No.:		Frank Acciarito 23-GTSIN-SHAB		Sampling Date:		6-11-24														
Sampled By/License #:						PLM			PLM-NOB		TEM		AAS		TCLP		EPA Method 8082		Results	
Sample #	Sample ID	Description of Composite Sample	Sample Location																	
	VFTM-11A	12" Floor Tile Master	Rm 313C																	
	↓ -11B	↓	↓																	
	VFTI-12A	Gray w/red streaks	Rm 322																	
	↓ -12B	↓	↓																	
	VFTM-12A	Master																		
	↓ -12B	↓	↓																	
Total No. of Samples:	6			Turnaround Request:				RUSH		12 hours		24 hours		48 hours		72 hours		5 days		
Laboratory Instructions:	Please e-mail results to																	<input checked="" type="checkbox"/>		
Relinquished By:			Date:	6-12-24		Time:		Received by:				Date:		6/13/24		Time:		1050		
Company: LANGAN								Company: AMERISCAN												

Laboratory Name:

A P P E N D I X B

Laboratory Results and Chain-of-Custody Documentation (PCB Caulk)



Monday, June 17, 2024

Attn: Vijay Patel
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Project ID: 101061160 ROCHAMBEAU AHS
SDG ID: GCQ94475
Sample ID#s: CQ94475

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Phyllis Shiller".

Phyllis Shiller

Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Sample Id Cross Reference

June 17, 2024

SDG I.D.: GCQ94475

Project ID: 101061160 ROCHAMBEAU AHS

Client Id	Lab Id	Matrix
HVC-1	CQ94475	CAULK



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Report

June 17, 2024

FOR: Attn: Vijay Patel
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information

Matrix: CAULK
Location Code: LANGANNJ
Rush Request: 5 Day
P.O.#:

Custody Information

Collected by: FA
Received by: SR1
Analyzed by: see "By" below

Date

06/11/24

Time

06/13/24 10:49

Laboratory Data

SDG ID: GCQ94475
Phoenix ID: CQ94475

Project ID: 101061160 ROCHAMBEAU AHS
Client ID: HVC-1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				06/13/24	R/RB	SW3545A
<u>Polychlorinated Biphenyls</u>							
PCB-1016	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
PCB-1221	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
PCB-1232	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
PCB-1242	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
PCB-1248	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
PCB-1254	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
PCB-1260	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
PCB-1262	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
PCB-1268	ND	740	ug/Kg	2	06/14/24	SC	SW8082A
<u>QA/QC Surrogates</u>							
% DCBP	42		%	2	06/14/24	SC	30 - 150 %
% DCBP (Confirmation)	47		%	2	06/14/24	SC	30 - 150 %
% TCMX	40		%	2	06/14/24	SC	30 - 150 %
% TCMX (Confirmation)	42		%	2	06/14/24	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
-----------	--------	------------	-------	----------	-----------	----	-----------

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL

BRL=Below Reporting Level L=Biased Low

QA/QC Surrogates: Surrogates are compounds (preceded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Results are reported on an ``as received`` basis, and are not corrected for dry weight.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.

The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director

June 17, 2024

Reviewed and Released by: Anil Makol, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102



QA/QC Report

June 17, 2024

QA/QC Data

SDG I.D.: GCQ94475


Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 735744 (ug/Kg), QC Sample No: CQ88807 10X (CQ94475)										
<u>Polychlorinated Biphenyls</u>										
PCB-1016	ND	170	107	109	1.9				40 - 140	30
PCB-1221	ND	170							40 - 140	30
PCB-1232	ND	170							40 - 140	30
PCB-1242	ND	170							40 - 140	30
PCB-1248	ND	170							40 - 140	30
PCB-1254	ND	170							40 - 140	30
PCB-1260	ND	170	105	104	1.0				40 - 140	30
PCB-1262	ND	170							40 - 140	30
PCB-1268	ND	170							40 - 140	30
% DCBP (Surrogate Rec)	104	%	113	115	1.8				30 - 150	30
% DCBP (Surrogate Rec) (Confirm)	122	%	119	128	7.3				30 - 150	30
% TCMX (Surrogate Rec)	95	%	104	102	1.9				30 - 150	30
% TCMX (Surrogate Rec) (Confirm)	99	%	111	111	0.0				30 - 150	30

Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference


Phyllis Shiller, Laboratory Director
June 17, 2024

Monday, June 17, 2024

Criteria: None
State: NY

Sample Criteria Exceedances Report
GCQ94475 - LANGANNJ

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
--------	-------	-----------------	----------	--------	----	----------	----------------	-------------------

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

June 17, 2024

SDG I.D.: GCQ94475

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report:

PCB Narration

AU-ECD5 06/14/24-1: CQ94475

The following Continuing Calibration compounds did not meet % deviation criteria:

Samples: CQ94475

Preceding CC 614B028 - PCB 1260 20%H (%)

Succeeding CC 614B040 - PCB 1260 20%H (%)



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



NY Temperature Narration

June 17, 2024

SDG I.D.: GCQ94475

The samples in this delivery group were received at 19.0°C.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

WVC 19, Page 1 of 1

[illegible]

A P P E N D I X C

Langan's Certifications and Laboratory Accreditations

WE ARE YOUR DOL



**Department
of Labor**

DIVISION OF SAFETY & HEALTH LICENSE AND CERTIFICATE UNIT, STATE OFFICE CAMPUS, BLDG. 12, ALBANY, NY 12226

ASBESTOS HANDLING LICENSE

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
300 Kimball Drive, 4th Floor, Parsippany, NJ, 07054

License Number: 70336

License Class: RESTRICTED

Date of Issue: 03/04/2024

Expiration Date: 03/31/2025

Duly Authorized Representative: Craig Napolitano

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

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

Amy Phillips, Director
For the Commissioner of Labor

EXCELSIOR

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



FRANK J ACCIARITO

CLASS(EXPIRES)

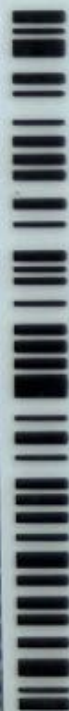
C ATEC (07/24) D INSP (07/24)

H PM (07/24)

CERT# 23-6TS1N-SHAB

MUST BE CARRIED ON ASBESTOS PROJECTS





01213 006914170 32

IF FOUND, RETURN TO:

NYSDOL - L&C UNIT

ROOM 161A BUILDING 12

STATE OFFICE CAMPUS

ALBANY NY 12226

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



ANDREW CHESKIN

CLASS(EXPIRES)

C ATEC (09/24) D INSP (09/24)

E MGPL (09/24) H PM (09/24)

I PD (09/24)

CERT# 23-61X9V-SHAB
DMV# 304231776

MUST BE CARRIED ON ASBESTOS PROJECTS



United States Environmental Protection Agency

This is to certify that

Langan Engineering, Environmental, Surveying,
Landscape Architecture & Geology D.P.C.

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 August 02, 2024

LBP-2233-2

Certification #

July 19, 2021

Issued On



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

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that



Frank J Acciarito

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

Risk Assessor

In the Jurisdiction of:

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

This certification is valid from the date of issuance and expires April 24, 2027

LBP-R-I220104-2

Certification #

April 05, 2024

Issued On



Ben Conetta, Manager

Chemicals and Multimedia Programs Branch

United States Environmental Protection Agency

This is to certify that



Andrew B Cheskin

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

Risk Assessor

In the Jurisdiction of:

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

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

LBP-R-11931-2

Certification #

August 02, 2021

Issued On



Ben Conetta, Chief

Chemicals and Multimedia Programs Branch

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MS. KAROL H. LU
AMERICA SCIENCE TEAM NEW YORK, INC
117 EAST 30TH ST
NEW YORK, NY 10016

NY Lab Id No: 11480

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

Serial No.: 68795

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200546-0

AmeriSci New York
New York, NY

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

Asbestos Fiber Analysis

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

2023-07-01 through 2024-06-30

Effective Dates

A handwritten signature in blue ink, reading "Dana S. Laman".

For the National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

AmeriSci New York

117 E. 30th Street

New York, NY 10016

Mr. Andrew Lee

Phone: 212-679-8600

Email: alee@amerisci.com

<http://www.amerisci.com>

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 200546-0

Bulk Asbestos Analysis

Code

Description

18/A01

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

18/A03

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

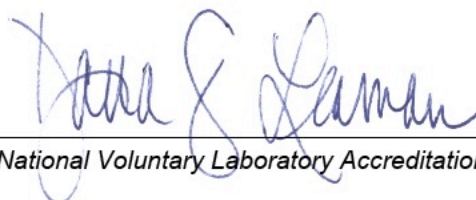
Airborne Asbestos Analysis

Code

Description

18/A02

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



For the National Voluntary Laboratory Accreditation Program

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MS. PHYLLIS SHILLER
PHOENIX ENVIRONMENTAL LABS
587 EAST MIDDLE TURNPIKE
MANCHESTER, CT 06040

NY Lab Id No: 11301

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards (2016) for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:*

Phthalate Esters

Benzyl butyl phthalate	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 625.1 EPA 8270D EPA 8270E
Diethyl phthalate	EPA 625.1 EPA 8270D EPA 8270E
Dimethyl phthalate	EPA 625.1 EPA 8270D EPA 8270E
Di-n-butyl phthalate	EPA 625.1 EPA 8270D EPA 8270E
Di-n-octyl phthalate	EPA 625.1 EPA 8270D EPA 8270E

Polychlorinated Biphenyls

Aroclor 1016 (PCB-1016)	EPA 8082A EPA 608.3
Aroclor 1221 (PCB-1221)	EPA 8082A EPA 608.3
Aroclor 1232 (PCB-1232)	EPA 8082A EPA 608.3
Aroclor 1242 (PCB-1242)	EPA 8082A EPA 608.3
Aroclor 1248 (PCB-1248)	EPA 8082A EPA 608.3

Serial No.: 68720

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.



NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2025
Issued April 01, 2024

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MS. PHYLLIS SHILLER
PHOENIX ENVIRONMENTAL LABS
587 EAST MIDDLE TURNPIKE
MANCHESTER, CT 06040

NY Lab Id No: 11301

*is hereby APPROVED as an Environmental Laboratory in conformance with the
National Environmental Laboratory Accreditation Conference Standards (2016) for the category
ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:*

Polychlorinated Biphenyls

Aroclor 1254 (PCB-1254)	EPA 8082A EPA 608.3
Aroclor 1260 (PCB-1260)	EPA 8082A EPA 608.3
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
PCB 101	EPA 8082A
PCB 105	EPA 8082A
PCB 118	EPA 8082A
PCB 128	EPA 8082A
PCB 138	EPA 8082A
PCB 153	EPA 8082A
PCB 170	EPA 8082A
PCB 18	EPA 8082A
PCB 180	EPA 8082A
PCB 183	EPA 8082A
PCB 184	EPA 8082A
PCB 187	EPA 8082A
PCB 195	EPA 8082A
PCB 206	EPA 8082A
PCB 209	EPA 8082A
PCB 28	EPA 8082A
PCB 44	EPA 8082A
PCB 49	EPA 8082A
PCB 52	EPA 8082A
PCB 66	EPA 8082A
PCB 8	EPA 8082A



Serial No.: 68720

Property of the New York State Department of Health. Certificates are valid only at the address shown and must be conspicuously posted by the laboratory. Continued accreditation depends on the laboratory's successful ongoing participation in the Program. Consumers may verify a laboratory's accreditation status online at <https://apps.health.ny.gov/pubdoh/applinks/wc/elappublicweb/>, by phone (518) 485-5570 or by email to elap@health.ny.gov.



A P P E N D I X D

File Search/Archive Materials/ Scope of Work Drawings

FINAL REPORT OF ENVIRONMENTAL SERVICES

Performed at:

**ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606**



Prepared by:



The Louis Berger Group, Inc.

**565 Taxter Road, 5th Floor
Elmsford, New York 10523**

Tel. (914) 798-3710

Fax (914) 592-1734

Project No. 3000828

Submission Date: September 09, 2013



The Louis Berger Group Inc.

565 Taxter Road, 5th Floor, Elmsford, NY 10523

Tel 914 798 3710

Fax 914 592 1734

www.louisberger.com

September 09, 2013

Mr. Frank Stefanelli
Director of Facilities
White Plains City School District
508 North Street
White Plains, NY 10605

**Subject: Final Report of Environmental Services
Rochambeau School
228 Fisher Avenue
White Plains, NY 10606**

Dear Mr. Stefanelli:

Louis Berger Group (LBG) has completed a material Inspection at Rochambeau School located at 228 Fisher Avenue, White Plains, NY 10606. The Inspection included visual observation, material sampling, and laboratory sample analysis of suspect Asbestos-Containing Materials (ACM), Lead Based Paints (LBP) & and Polychlorinated Biphenyls (PCBs) associated with proposed HVAC and interior renovations.

The attached report presents descriptions and results of the material sampling procedures and visual analysis. Relevant general project information is provided, followed by our findings, assessments and recommendations. Laboratory analysis data and certifications are provided in the Appendices.

If you have any questions concerning this report or if we may be of further assistance to you, please contact us.

Sincerely,

THE LOUIS BERGER GROUP (LBG)

Craig Napolitano, CHMM
Director, Industrial Hygiene & Hazmat Services



Final Report for Environmental Inspection Services

TABLE OF CONTENTS

	Page
1.0 EXECUTIVE SUMMARY	1
2.0 FIELD INSPECTION PROCEDURES AND SAMPLE ANALYSIS METHODS	4
3.0 INSPECTION SCOPE AND MATERIAL ASSESSMENT	7
4.0 INSPECTION RESULTS.....	12
5.0 AREAS NOT ACCESSIBLE	15
6.0 CONCLUSIONS AND RECOMMENDATIONS	16
7.0 REPORT CERTIFICATIONS.....	16

Appendices

Appendix A: Asbestos Sample Analysis Results in Tabular Form

Appendix B: Asbestos Bulk Sample Field Data Sheets with Chain of Custody & Laboratory Results

Appendix C: Asbestos Bulk Sample Location Drawings

Appendix D: Asbestos Containing Materials Location Drawings

Appendix E: Lead XRF Shot Results

Appendix F: Lead XRF Shot Location Drawings

Appendix G: PCB Bulk Sample Field Data Sheets with Chain of Custody & Laboratory Results

Appendix H: PCB Bulk Sample Location Drawings

Appendix I: Company License, Personnel Certifications and Laboratory Accreditations

Appendix J: Photographic Documentation



Final Report for Environmental Inspection Services

1.0 EXECUTIVE SUMMARY

Louis Berger Group, Inc (LBG) has performed a renovation specific material Inspection for the presence or absence of Asbestos-Containing Materials (ACM), Lead Based Paints (LBP) and Polychlorinated Biphenyls (PCBs) at Rochambeau School located at 228 Fisher Avenue, White Plains, NY 10606. The intent of this Inspection was to screen for Asbestos-Containing Materials (ACM), Lead Based Paints (LBP) and Polychlorinated Biphenyls (PCBs) that may be impacted during the proposed HVAC/interior renovations.

Drew Cheskin & Josue Garcia of LBG performed this Inspection on August 19th, 2013. Mr. Cheskin has New York State Department of Labor (NYSDOL) Asbestos Inspector License (Cert# 05-04280) and New York State EPA as a Lead Inspector (Cert# NY-I-11931-2). Mr. Garcia has New York State Department of Labor (NYSDOL) Asbestos Inspector License (Cert# 01-04292) and New York State EPA as a Lead Risk Assessor (Cert# NY-R-6928-3). The results of the visual inspection and bulk sample analysis determined that the following suspect ACM and LBP materials may be impacted by the HVAC/interior renovation project:

A. ASBESTOS-CONTAINING MATERIAL

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

- **Exterior Garage Door Frame Caulk, Beige**

Analytical results of the bulk samples collected indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Ceiling Plaster, White Coat
- Ceiling Plaster, Brown Coat
- Wall Plaster, White Coat
- Wall Plaster, Brown Coat
- Ceiling Deck (gymnasium)
- 1'x1' Ceiling Tile, Textured
- 1'x1' Ceiling Tile, Textured, Mastic
- Terrazzo Flooring
- Interior Brick Mortar
- Exterior Window Frame Caulk, Grey
- Exterior Brick Mortar
- 2'x4' Ceiling Tile, Patterned/Pinhole (old gymnasium)
- 1'x1' Ceiling Tile, Pinhole (old gymnasium)
- 1'x1' Ceiling Tile, Pinhole, Mastic (old gymnasium)
- Brick Mortar (old gymnasium)
- Interior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Beige (to A/C units)



Final Report for Environmental Inspection Services

- Exterior Stone Window Sill Caulk, Grey
- Exterior Brick Mortar (newer)
- Wall Plaster, White Coat (Auditorium Stage)
- Wall Plaster, Brown Coat (Auditorium Stage)
- Pipe Joint to Fiberglass Pipe Insulation
- Interior Brick Mortar (Foundation Brick)
- Pipe Gasket
- 1'x1' Ceiling Tile, Pinhole (Cafeteria)
- 1'x1' Ceiling Tile, Pinhole, Mastic (Cafeteria)
- 1'x1' Ceiling Tile, Spline
- CMU Mortar
- Caulking to Exterior Stone Window Detailing
- Putty to Main Entry Door Windows
- Exterior Door Frame Caulk, Tan
- Exterior Garage Door Frame Caulk, Grey
- Exterior Window Frame Caulk, Off White
- Exterior Door Frame Caulk, Cream
- Exterior Window Frame Caulk, Tan
- Exterior Louvre Caulk, Grey
- Roof Fabric (top layer, over foam)
- Roof Tar (third layer, below foam)
- Roof Decking (bottom layer, below roof tar)

B. LEAD-BASED PAINT

Based upon XRF readings, lead has been confirmed to exist in the following tested combinations:

- **Silver Metal Ceiling Frame Work (FS-1)**
- **Beige Wood Interior Window Frame (FS-11)**
- **Green Metal Pipe (FS-18)**

Lead was **not detected** in the following tested combinations via XRF readings:

- Silver Concrete Ceiling Deck (FS-1)
- White Concrete Wall (FS-1)
- White Ceiling Plaster (FS-2)
- Beige Plaster Wall (FS-2)
- Beige Plaster Wall (FS-3)
- Beige Plaster Wall (FS-5)
- White Ceiling Plaster (FS-5)
- Yellow Plaster Wall (FS-7)
- Beige Brick Wall (FS-11)



Final Report for Environmental Inspection Services

- Beige Metal Partition Wall (FS-11)
- Black Metal Partition Baseboard (FS-11)
- Beige Plaster Wall (FS-12)
- Yellow Plaster Wall (FS-14)
- Beige Concrete Wall (FS-18)
- Pink Concrete Wall (FS-18)
- White Concrete Wall (FS-18)
- Pink Brick Wall (FS-18)
- Beige Brick Wall (FS-18)
- Yellow Plaster Wall (FS-19)
- Beige Brick Wall (FS-17)
- Beige Fiberglass Pipe Insulation (FS-17)
- Beige Plaster Wall (FS-17)
- Beige Metal Duct Work (FS-17)
- Beige Concrete Ceiling (FS-17)
- Beige 1'x1' Ceiling Tile, Pinhole (FS-17)
- Beige Metal Radiator (FS-17)
- Beige Concrete Wall (FS-17)
- Pea Green Metal Duct (FS-17)
- Off White Plaster Ceiling (FS-17)
- Yellow Plaster Wall (FS-20)

C. PCB-CONTAINING MATERIAL

Analytical results of the bulk samples collected indicate that the following materials **contain PCB** (greater than 50 PPM).

- None

Analytical results of the bulk samples collected indicate that the following materials **did not contain PCB** (less than 50 PPM);

- Exterior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Beige (to A/C units)
- Exterior Stone Window Sill Caulk, Grey
- Exterior Door Frame Caulk, Tan
- Exterior Garage Door Frame Caulk, Grey
- Exterior Window Frame Caulk, Off White
- Exterior Door Frame Caulk, Cream
- Exterior Window Frame Caulk, Tan
- Exterior Louvre Caulk, Grey



Final Report for Environmental Inspection Services

2.0 FIELD INSPECTION PROCEDURES AND SAMPLE ANALYSIS METHODS

ASBESTOS-CONTAINING MATERIAL

Guidelines used for the inspection were established by the Environmental Protection Agency (EPA) in the Guidance for Controlling Asbestos Containing Materials in Buildings, Office of Pesticides and Toxic Substances, Doc 560/5-85-024, and 40 CFR Part 763, Asbestos Hazard Emergency Response Act (AHERA)

Field information was organized in accordance with the AHERA methodology of homogenous area (HA). During the Inspection, reasonable effort was made to identify all locations and types of ACM materials associated with the scope of work. Sampling has included multiple samples of the same materials chosen at random. However, due to inconsistencies of a manufacturer's processes and the contractor's installation methods, materials of similar construction may contain various amounts of asbestos. Furthermore, some materials that were not originally specified to contain asbestos may in fact contain this mineral. For example, cementitious pipe insulation and plaster were frequently mixed with asbestos at the construction site for ease of application. Locating all asbestos materials can only be definitively achieved by conducting exploratory demolition and sampling every section of pipe insulation, fitting or valve covering, fireproofing, and other suspect ACM.

Bulk samples of suspect ACM are analyzed using polarized light microscopy (PLM) coupled with dispersion staining, as described in 40 CFR Part 763 and the National Emissions Standard for Hazardous Air Pollutants (NESHAPS). NESHAPS is the standard industry protocol for the determination of asbestos in building materials. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The color displays that result are compared to a standardized atlas whereby the specific variety of asbestos is determined. It should also be recognized that PLM is primarily a qualitative identification method whereby asbestos percentage, if any, is estimated. While EPA, New York State, and New York City regulations governing ACM consider materials containing greater than 1-percent as asbestos, accurately quantifying asbestos content below 5-percent has been shown to be unreliable.

The New York State Department of Health has recently revised the PLM Stratified Point Counting Method. The March 25th, 2011 method, "Polarized Light Microscopy Methods for Identifying and Quantifying Asbestos in Bulk Samples" can be found as Item 198.1 in the Environmental Laboratory Approval program (ELAP) Certification manual. Whereas the procedure of analysis for bulk samples that fall into the category of "Non-friable Organically Bound" (NOB) can be found in the March 25th 2011 method "Polarized-Light Microscope Method for Identifying and Quantifying Asbestos in Non-Friable Organically Bound Bulk Samples", Item 198.6 in the ELAP Certification Manual. This category includes any sample in a flexible to rigid asphalt or vinyl matrix (floor tiles, mastic, roofing shingles, roofing felt, etc.). These samples must be "ashed" in a muffle furnace at 480-degrees Celsius (to remove organic matrix), treated with acid (to remove any mineral carbonate), and filtered through a 0.4-micron polycarbonate filter before being analyzed by PLM. The sample must be weighted between each of these steps to track the percent loss of organic matrix.



Final Report for Environmental Inspection Services

ELAP has determined that analysis of NOB materials is not reliably performed by PLM. Therefore, if PLM analysis yields results of 1-percent asbestos or less, the result must be confirmed by TEM. For bulk samples that undergo TEM analysis, the March 25th, 2011 method "Transmission Electron Microscope Method for Identifying and Quantitating Asbestos in Non-Friable organically Bound Bulk Samples" must be used and can be found as Item 198.4 in the ELAP Certification Manual. ELAP certified laboratories must include the following statement with their PLM analysis results for each "negative" (1-percent or less asbestos) NOB sample: "Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Before this material can be considered or treated as non-ACM, confirmation must be made by quantitative transmission electron microscopy".

All samples are initially analyzed by Polarized Light Microscopy in accordance with Item 198.1 and 198.6 of the ELAP Certification Manual. Samples which yield a negative PLM result, and which are classified as a "non-friable" material, are then re-analyzed utilizing TEM methodology in accordance with Item 198.4 of the ELAP Certification Manual. The laboratory performing both these analysis procedures is EMSL located at 307 West 38th Street, New York, NY 10018. The laboratory has received accreditation from the following agencies:

- National Voluntary Laboratory Accreditation Program (Lab Code 101048-9)
- New York State Environmental Laboratory Approval Program (Lab No. 11506)
- American Industrial Hygiene Association Accredited Laboratory (Lab No. 102581)

LEAD-BASED PAINT

Any work which disturbs painted surfaces containing lead shall be performed in accordance with the Occupational Safety and Health Administrations (OSHA) 29 CFR 1926.62 (Lead in Construction Standard) and EPA's 40 CFR 745 regulations. Personal air monitoring should be conducted when disturbing lead based paints and lead containing materials as per 29CFR1926.62 (OSHA).

In addition, all waste generated as part of this project, regardless of the lead content in the paint, should be tested in accordance with the EPA Resource Conservation and Recovery Act (RCRA) to determine the classification of the waste. Under RCRA, any waste material that, when tested by Toxicity Characteristics Leaching Procedure (TCLP), results in a leachate lead concentration of five (5) parts per million or greater must be disposed of at an EPA licensed hazardous waste facility.

The finer renovation debris and paint chips that result from renovation of components with measurable quantities of lead can be tested by TCLP, or can be assumed hazardous waste and disposed of accordingly (not applicable for this project).

The cost of the TCLP depends on the laboratory and location; but typically, a full TCLP analysis may cost from \$150 to \$350. Any waste material, that when tested by TCLP, results in a leachate



Final Report for Environmental Inspection Services

lead concentration of five (5) parts per million or greater must be disposed of at an EPA licensed hazardous waste facility. Cost of disposal may range from \$5,000 to \$7,000 per ton of waste.

POLYCHLORINATED BIPHENYLS (PCBs)

PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications.

Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 PCB ban. Products that may contain PCBs include: Transformers and capacitors, Oil used in motors and hydraulic systems, Fluorescent light ballasts, Adhesives and tapes, Caulking, Plastics, etc.

The PCBs used in these products were chemical mixtures made up of a variety of individual chlorinated biphenyl components, known as congeners. Most commercial PCB mixtures are known in the United States by their industrial trade names. The most common trade name is aroclor.

Polychlorinated biphenyls (PCBs) are regulated pursuant to the United States Environmental Protection Agency Code of Federal Regulations (40 CFR Part 761), the Toxic Substances Control Act (TSCA – 15 U.S.C. 2605), New York State Department of Environmental Conservation 6NYCRR 370-376 and federal Occupational Safety and Health Administration (OSHA) 29CFR 1926 & 1910. These regulations require certain testing and reporting requirements to determine management, recycling and disposal options for PCBs.



Final Report for Environmental Inspection Services

3.0 INSPECTION SCOPE AND MATERIAL ASSESSMENT

The areas inspected for ACM materials & LBP that may be impacted by the proposed renovations:

- Corridors at Stair Landings
- Backflow Preventer Room
- Ceilings/Walls/HVAC Equipment in the Media Center, Gymnasium, Auditorium Stage and Cafeteria
- Exterior Windows/Doors
- Stage Roof

A. ASBESTOS-CONTAINING MATERIAL

Materials examined during the Berger Inspection included:

- Ceiling Plaster, White Coat
- Ceiling Plaster, Brown Coat
- Wall Plaster, White Coat
- Wall Plaster, Brown Coat
- Ceiling Deck (gymnasium)
- 1'x1' Ceiling Tile, Textured
- 1'x1' Ceiling Tile, Textured, Mastic
- Terrazzo Flooring
- Interior Brick Mortar
- Exterior Window Frame Caulk, Grey
- Exterior Brick Mortar
- 2'x4' Ceiling Tile, Patterned/Pinhole (old gymnasium)
- 1'x1' Ceiling Tile, Pinhole (old gymnasium)
- 1'x1' Ceiling Tile, Pinhole, Mastic (old gymnasium)
- Brick Mortar (old gymnasium)
- Interior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Beige (to A/C units)
- Exterior Stone Window Sill Caulk, Grey
- Exterior Brick Mortar (newer)
- Wall Plaster, White Coat (Auditorium Stage)
- Wall Plaster, Brown Coat (Auditorium Stage)
- Pipe Joint to Fiberglass Pipe Insulation
- Interior Brick Mortar (Foundation Brick)
- Pipe Gasket
- 1'x1' Ceiling Tile, Pinhole (Cafeteria)
- 1'x1' Ceiling Tile, Pinhole, Mastic (Cafeteria)
- 1'x1' Ceiling Tile, Spline



Final Report for Environmental Inspection Services

- CMU Mortar
- Caulking to Exterior Stone Window Detailing
- Putty to Main Entry Door Windows
- Exterior Door Frame Caulk, Tan
- Exterior Garage Door Frame Caulk, Beige
- Exterior Garage Door Frame Caulk, Grey
- Exterior Window Frame Caulk, Off White
- Exterior Door Frame Caulk, Cream
- Exterior Window Frame Caulk, Tan
- Exterior Louvre Caulk, Grey
- Roof Fabric (top layer, over foam)
- Roof Tar (third layer, below foam)
- Roof Decking (bottom layer, below roof tar)

Based upon visual inspection and bulk sample analysis asbestos has been confirmed to exist in the following materials:

- **Exterior Garage Door Frame Caulk, Beige**

Asbestos was **not detected** in the following materials via PLM and/or TEM analysis:

- Ceiling Plaster, White Coat
- Ceiling Plaster, Brown Coat
- Wall Plaster, White Coat
- Wall Plaster, Brown Coat
- Ceiling Deck (gymnasium)
- 1'x1' Ceiling Tile, Textured
- 1'x1' Ceiling Tile, Textured, Mastic
- Terrazzo Flooring
- Interior Brick Mortar
- Exterior Window Frame Caulk, Grey
- Exterior Brick Mortar
- 2'x4' Ceiling Tile, Patterned/Pinhole (old gymnasium)
- 1'x1' Ceiling Tile, Pinhole (old gymnasium)
- 1'x1' Ceiling Tile, Pinhole, Mastic (old gymnasium)
- Brick Mortar (old gymnasium)
- Interior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Beige (to A/C units)
- Exterior Stone Window Sill Caulk, Grey
- Exterior Brick Mortar (newer)
- Wall Plaster, White Coat (Auditorium Stage)
- Wall Plaster, Brown Coat (Auditorium Stage)
- Pipe Joint to Fiberglass Pipe Insulation



Final Report for Environmental Inspection Services

- Interior Brick Mortar (Foundation Brick)
- Pipe Gasket
- 1'x1' Ceiling Tile, Pinhole (Cafeteria)
- 1'x1' Ceiling Tile, Pinhole, Mastic (Cafeteria)
- 1'x1' Ceiling Tile, Spline
- CMU Mortar
- Caulking to Exterior Stone Window Detailing
- Putty to Main Entry Door Windows
- Exterior Door Frame Caulk, Tan
- Exterior Garage Door Frame Caulk, Grey
- Exterior Window Frame Caulk, Off White
- Exterior Door Frame Caulk, Cream
- Exterior Window Frame Caulk, Tan
- Exterior Louvre Caulk, Grey
- Roof Fabric (top layer, over foam)
- Roof Tar (third layer, below foam)
- Roof Decking (bottom layer, below roof tar)

B. LEAD-BASED PAINT

Surfaces examined during the Inspection included:

- Silver Concrete Ceiling Deck (FS-1)
- Silver Metal Ceiling Frame Work (FS-1)
- White Concrete Wall (FS-1)
- White Ceiling Plaster (FS-2)
- Beige Plaster Wall (FS-2)
- Beige Plaster Wall (FS-3)
- Beige Plaster Wall (FS-5)
- White Ceiling Plaster (FS-5)
- Yellow Plaster Wall (FS-7)
- Beige Brick Wall (FS-11)
- Beige Metal Partition Wall (FS-11)
- Black Metal Partition Baseboard (FS-11)
- Beige Wood Interior Window Frame (FS-11)
- Beige Plaster Wall (FS-12)
- Yellow Plaster Wall (FS-14)
- Beige Concrete Wall (FS-18)
- Pink Concrete Wall (FS-18)
- White Concrete Wall (FS-18)
- Pink Brick Wall (FS-18)
- Beige Brick Wall (FS-18)
- Green Metal Pipe (FS-18)



Final Report for Environmental Inspection Services

- Yellow Plaster Wall (FS-19)
- Beige Brick Wall (FS-17)
- Beige Fiberglass Pipe Insulation (FS-17)
- Beige Plaster Wall (FS-17)
- Beige Metal Duct Work (FS-17)
- Beige Concrete Ceiling (FS-17)
- Beige 1'x1' Ceiling Tile, Pinhole (FS-17)
- Beige Metal Radiator (FS-17)
- Beige Concrete Wall (FS-17)
- Pea Green Metal Duct (FS-17)
- Off White Plaster Ceiling (FS-17)
- Yellow Plaster Wall (FS-20)

Based upon XRF readings, lead has been confirmed to exist in the following tested combinations:

- **Silver Metal Ceiling Frame Work (FS-1)**
- **Beige Wood Interior Window Frame (FS-11)**
- **Green Metal Pipe (FS-18)**

Lead was **not detected** in the following tested combinations via XRF readings:

- Silver Concrete Ceiling Deck (FS-1)
- White Concrete Wall (FS-1)
- White Ceiling Plaster (FS-2)
- Beige Plaster Wall (FS-2)
- Beige Plaster Wall (FS-3)
- Beige Plaster Wall (FS-5)
- White Ceiling Plaster (FS-5)
- Yellow Plaster Wall (FS-7)
- Beige Brick Wall (FS-11)
- Beige Metal Partition Wall (FS-11)
- Black Metal Partition Baseboard (FS-11)
- Beige Plaster Wall (FS-12)
- Yellow Plaster Wall (FS-14)
- Beige Concrete Wall (FS-18)
- Pink Concrete Wall (FS-18)
- White Concrete Wall (FS-18)
- Pink Brick Wall (FS-18)
- Beige Brick Wall (FS-18)
- Yellow Plaster Wall (FS-19)
- Beige Brick Wall (FS-17)
- Beige Fiberglass Pipe Insulation (FS-17)



Final Report for Environmental Inspection Services

- Beige Plaster Wall (FS-17)
- Beige Metal Duct Work (FS-17)
- Beige Concrete Ceiling (FS-17)
- Beige 1'x1' Ceiling Tile, Pinhole (FS-17)
- Beige Metal Radiator (FS-17)
- Beige Concrete Wall (FS-17)
- Pea Green Metal Duct (FS-17)
- Off White Plaster Ceiling (FS-17)
- Yellow Plaster Wall (FS-20)

C. PCB-CONTAINING MATERIAL

Materials examined during the Inspection included:

- Exterior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Beige (to A/C units)
- Exterior Stone Window Sill Caulk, Grey
- Exterior Door Frame Caulk, Tan
- Exterior Garage Door Frame Caulk, Grey
- Exterior Window Frame Caulk, Off White
- Exterior Door Frame Caulk, Cream
- Exterior Window Frame Caulk, Tan
- Exterior Louvre Caulk, Grey

Based upon visual inspection and bulk sample, PCBs have been confirmed to exist in the following materials:

- None

PCB was **not detected** in the following testing combinations within the building via bulk sample analysis:

- Exterior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Grey
- Interior Window Frame Caulk, Beige (to A/C units)
- Exterior Stone Window Sill Caulk, Grey
- Exterior Door Frame Caulk, Tan
- Exterior Garage Door Frame Caulk, Grey
- Exterior Window Frame Caulk, Off White
- Exterior Door Frame Caulk, Cream
- Exterior Window Frame Caulk, Tan
- Exterior Louvre Caulk, Grey



Final Report for Environmental Inspection Services

4.0 INSPECTION RESULTS

A. ASBESTOS-CONTAINING MATERIAL

The asbestos inspection involved a thorough visual examination of all areas that may be impacted by the proposed exterior renovation project. The following suspect materials were sampled and analyzed for asbestos content by Berger:

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
01	Functional Spaces 2, 3, 5, 8, 9, 15, 17, 19, 20	Ceiling Plaster, White Coat	NAD
02	Functional Spaces 2, 3, 5, 8, 9, 15, 17, 19, 20	Ceiling Plaster, Brown Coat	NAD
03	Functional Spaces 2, 3, 5, 8, 9, 15, 17, 19, 20	Wall Plaster, White Coat	NAD
04	Functional Spaces 2, 3, 5, 8, 9, 15, 17, 19, 20	Wall Plaster, Brown Coat	NAD
05	Functional Space 1	Ceiling Deck (gymnasium)	NAD
06	Functional Spaces 3, 9	1'x1' Ceiling Tile, Textured	NAD
07	Functional Spaces 3, 9	1'x1' Ceiling Tile, Textured, Mastic	NAD
08	Functional Spaces 3, 8	Terrazzo Flooring	NAD
09	Functional Spaces 3, 9	Interior Brick Mortar	NAD
10	West & East Facades	Exterior Window Frame Caulk, Grey	<1.0% Chrysotile
11	West & South Facades	Exterior Brick Mortar	NAD
12	Functional Space 11	2'x4' Ceiling Tile, Patterned/Pinhole (old gymnasium)	NAD
13	Functional Space 11	1'x1' Ceiling Tile, Pinhole (old gymnasium)	NAD
14	Functional Space 11	1'x1' Ceiling Tile, Pinhole, Mastic (old gymnasium)	NAD
15	Functional Space 11	Brick Mortar (old gymnasium)	NAD
16	Functional Space 11	Interior Window Frame Caulk, Grey	<1.0% Anthophyllite
17	Functional Space 11	Interior Window Frame Caulk, Beige (to A/C units)	<1.0% Anthophyllite
18	East & North Facades	Exterior Stone Window Sill Caulk, Grey	NAD
19	East Facade	Exterior Brick Mortar (newer)	NAD
20	Functional Space 12	Wall Plaster, White Coat (Auditorium Stage)	NAD
21	Functional Space 12	Wall Plaster, Brown Coat (Auditorium Stage)	NAD
22	Functional Spaces 17, 18	Pipe Joint to Fiberglass Pipe Insulation	NAD



Final Report for Environmental Inspection Services

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
23	Functional Spaces 18, 19	Interior Brick Mortar (Foundation Brick)	NAD
24	Functional Spaces 18	Pipe Gasket	NAD
25	Functional Spaces 17	1'x1' Ceiling Tile, Pinhole (Cafeteria)	NAD
26	Functional Spaces 17	1'x1' Ceiling Tile, Pinhole, Mastic (Cafeteria)	NAD
27	Functional Spaces 17	1'x1' Ceiling Tile, Spline	NAD
28	Functional Spaces 17	CMU Mortar	NAD
29	East Façade	Caulking to Exterior Stone Window Detailing	NAD
30	East Façade, Main Entrance	Putty to Main Entry Door Windows	<1.0% Anthophyllite
31	South Façade	Exterior Door Frame Caulk, Tan	NAD
32	West Façade	Exterior Garage Door Frame Caulk, Beige	3.7% Chrysotile
33	West Façade	Exterior Garage Door Frame Caulk, Grey	<1.0% Anthophyllite
34	West Façade	Exterior Window Frame Caulk, Off White	NAD
35	West Façade	Exterior Door Frame Caulk, Cream	NAD
36	West Façade	Exterior Window Frame Caulk, Tan	NAD
37	West Façade	Exterior Louvre Caulk, Grey	NAD
38	Stage Roof	Roof Fabric (top layer, over foam)	NAD
39	Stage Roof	Roof Tar (third layer, below foam)	NAD
40	Stage Roof	Roof Decking (bottom layer, below roof tar)	NAD

Bold = Positive for ACM NAD = No Asbestos Detected

B. LEAD-BASED PAINT

The lead Inspection involved a thorough visual examination of all accessible areas impacted by the proposed exterior renovations. The following suspect surfaces were tested for lead content:

SAMPLE LOCATION	BUILDING COMPONENT	COLOR	SUBSTRATE	CONDITION	LEAD CONTENT (mg/cm ²)
Calibration Check @ 1.0	---	---	---	---	1.1
Calibration Check @ 1.0	---	---	---	---	1.0
Calibration Check @ 1.0	---	---	---	---	1.1
Calibration Check @ 0.0	---	---	---	---	0.0
Calibration Check @ 0.0	---	---	---	---	0.0
Calibration Check @ 0.0	---	---	---	---	0.0
Functional Space 1	Ceiling Deck	Silver	Concrete	G	-0.2
Functional Space 1	Ceiling Frame Work	Silver	Metal	G	5.7
Functional Space 1	Wall	White	Concrete	G	-0.2



Final Report for Environmental Inspection Services

SAMPLE LOCATION	BUILDING COMPONENT	COLOR	SUBSTRATE	CONDITION	LEAD CONTENT (mg/cm2)
Functional Space 2	Ceiling	White	Plaster	G	0.5
Functional Space 2	Wall	Beige	Plaster	G	0.0
Functional Space 3	Wall	Beige	Plaster	G	0.5
Functional Space 5	Wall	Beige	Plaster	G	0.4
Functional Space 5	Ceiling	White	Plaster	G	0.3
Functional Space 7	Wall	Yellow	Plaster	G	0.5
Functional Space 11	Wall	Beige	Brick	G	-0.1
Functional Space 11	Partition Wall	Beige	Metal	G	0.2
Functional Space 11	Partition Baseboard	Black Metal	Metal	G	0.3
Functional Space 11	Interior Window Frame	Beige	Wood	G	>9.9
Functional Space 12	Wall	Beige	Plaster	G	0.3
Functional Space 14	Wall	Yellow	Plaster	G	0.0
Functional Space 18	Wall	Beige	Concrete	G	0.4
Functional Space 18	Wall	Pink	Concrete	G	0.7
Functional Space 18	Wall	White	Concrete	G	0.5
Functional Space 18	Wall	Pink	Brick	G	0.4
Functional Space 18	Wall	Beige	Brick	G	0.6
Functional Space 18	Pipe	Green	Metal	G	2.5
Functional Space 19	Wall	Yellow	Plaster	G	0.3
Functional Space 17	Wall	Beige	Brick	G	0.4
Functional Space 17	Pipe Insulation	Beige	Fiberglass	G	0.1
Functional Space 17	Wall	Beige	Plaster	G	0.3
Functional Space 17	Duct Work	Beige	Metal	G	0.3
Functional Space 17	Ceiling	Beige	Concrete	G	0.2
Functional Space 17	1'x1' Ceiling Tile, Pinhole	Beige	Ceiling Tile	G	-0.1
Functional Space 17	Radiator	Beige	Metal	G	0.5
Functional Space 17	Wall	Beige	Concrete	G	0.3
Functional Space 17	Duct Work	Pea Green	Metal	G	1.0
Functional Space 17	Ceiling	Off White	Plaster	G	-0.1
Functional Space 20	Wall	Yellow	Plaster	G	0.3
Calibration @ 1.0	---	---	---	---	1.2
Calibration @ 1.0	---	---	---	---	1.1
Calibration @ 1.0	---	---	---	---	1.1

Bold = Positive for LEAD



Final Report for Environmental Inspection Services

C. PCB-CONTAINING MATERIAL

The PCB Inspection involved a thorough visual examination of all areas that may be impacted by the proposed exterior renovations. The following suspect materials were tested for PCB content:

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	PCB CONTENT (PPM)
01	West & East Facades	Exterior Window Frame Caulk, Grey	ND
02	Functional Space 11	Interior Window Frame Caulk, Grey	ND
03	Functional Space 11	Interior Window Frame Caulk, Beige	ND
04	East & North Facades	Exterior Stone Window Sill Caulk, Grey	ND
05	South Façade	Exterior Door Frame Caulk, Tan	ND
06	West Façade	Exterior Garage Door Frame Caulk, Grey	ND
07	West Façade	Exterior Window Frame Caulk, Off White	ND
08	West Façade	Exterior Door Frame Caulk, Cream	ND
09	West Façade	Exterior Window Frame Caulk, Tan	ND
10	West Façade	Exterior Louver Caulk, Grey	ND

Bold = Positive for PCB ND = No PCB Detected

4.2 SAMPLE ANALYSIS TABLE

ACM laboratory analysis results are included in Appendix A.

5.0 AREAS NOT ACCESSIBLE

During the Inspection the following areas were not accessible:

- Ceiling of Stage Area

Void Spaces within Walls: No destructive sampling was performed on concealed spaces in walls to access plenum, chases etc. It should be assumed that asbestos, lead and PCB containing materials may exist in these spaces. Any suspect materials encountered during work should be sampled for analysis before work continues.



Final Report for Environmental Inspection Services

6.0 CONCLUSIONS AND RECOMMENDATIONS

ACM and LBP have been identified in this inspection that may be impacted by the proposed renovations. These materials, reported in Section 3.0 of this report, may require complete removal prior to the start of the exterior renovation project. No PCB materials were identified by this inspection.

The ACM, LBP and PCB Inspection was conducted at the request of H2M on behalf of the White Plains City School District for the proposed HVAC/interior renovations. Any change in the scope of work will require further investigation to accurately classify any additional ACM, LBP & PCB resulting from the modified or updated scope of work.

7.0 REPORT CERTIFICATIONS

This report, and the supporting data, findings, conclusions, opinions, and recommendations it contains represent the result of LBG's efforts for the environmental inspection work for the Rochambeau School.

Opinions and recommendations presented in this report apply to site conditions and features as they existed at the time of LBG's site visits, and those reasonably foreseeable. They cannot necessarily apply to conditions and features of which LBG is unaware and has not had the opportunity to evaluate.

The conclusions presented in this report are professional opinions solely upon LBG's visual observations of accessible areas, laboratory test data, and current regulatory requirements. These conclusions are intended exclusively for the purpose stated herein and the site indicated for the project indicated.

Prepared by:

Andrew Cheskin
NYS DOL Inspector

Reviewed by:

Craig Napolitano, CHMM
Assoc. Vice President, Industrial
Hygiene & Hazmat Services



Final Report for Environmental Inspection Services

APPENDIX A: ASBESTOS SAMPLE ANALYSIS RESULTS IN TABULAR FORM



Final Report For Environmental Inspection Services

APPENDIX A SAMPLE ANALYSIS RESULTS IN TABULAR FORM ROCHAMBEAU SCHOOL 228 FISHER AVENUE WHITE PLAINS, NY 10606

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
01	01A	Functional Space 2	Ceiling Plaster, White Coat	NAD	N/A
01	01B	Functional Space 3	Ceiling Plaster, White Coat	NAD	N/A
01	01C	Functional Space 5	Ceiling Plaster, White Coat	NAD	N/A
01	01D	Functional Space 8	Ceiling Plaster, White Coat	NAD	N/A
01	01E	Functional Space 9	Ceiling Plaster, White Coat	NAD	N/A
01	01F	Functional Space 15	Ceiling Plaster, White Coat	NAD	N/A
01	01G	Functional Space 17	Ceiling Plaster, White Coat	NAD	N/A
01	01H	Functional Space 19	Ceiling Plaster, White Coat	NAD	N/A
01	01I	Functional Space 20	Ceiling Plaster, White Coat	NAD	N/A
02	02A	Functional Space 2	Ceiling Plaster, Brown Coat	NAD	N/A
02	02B	Functional Space 3	Ceiling Plaster, Brown Coat	NAD	N/A
02	02C	Functional Space 5	Ceiling Plaster, Brown Coat	NAD	N/A
02	02D	Functional Space 8	Ceiling Plaster, Brown Coat	NAD	N/A
02	02E	Functional Space 9	Ceiling Plaster, Brown Coat	NAD	N/A
02	02F	Functional Space 15	Ceiling Plaster, Brown Coat	NAD	N/A
02	02G	Functional Space 17	Ceiling Plaster, Brown Coat	NAD	N/A
02	02H	Functional Space 19	Ceiling Plaster, Brown Coat	NAD	N/A

Bold = Positive for ACM
NAD = No Asbestos Detected

N/A = Not Applicable
NA/PS = Not analyzed/ positive sample



Final Report For Environmental Inspection Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
02	02I	Functional Space 20	Ceiling Plaster, Brown Coat	NAD	N/A
03	03A	Functional Space 2	Wall Plaster, White Coat	NAD	N/A
03	03B	Functional Space 3	Wall Plaster, White Coat	NAD	N/A
03	03C	Functional Space 5	Wall Plaster, White Coat	NAD	N/A
03	03D	Functional Space 8	Wall Plaster, White Coat	NAD	N/A
03	03E	Functional Space 9	Wall Plaster, White Coat	NAD	N/A
03	03F	Functional Space 15	Wall Plaster, White Coat	NAD	N/A
03	03G	Functional Space 17	Wall Plaster, White Coat	NAD	N/A
03	03H	Functional Space 19	Wall Plaster, White Coat	NAD	N/A
03	03I	Functional Space 20	Wall Plaster, White Coat	NAD	N/A
04	04A	Functional Space 2	Wall Plaster, Brown Coat	NAD	N/A
04	04B	Functional Space 3	Wall Plaster, Brown Coat	NAD	N/A
04	04C	Functional Space 5	Wall Plaster, Brown Coat	NAD	N/A
04	04D	Functional Space 8	Wall Plaster, Brown Coat	NAD	N/A
04	04E	Functional Space 9	Wall Plaster, Brown Coat	NAD	N/A
04	04F	Functional Space 15	Wall Plaster, Brown Coat	NAD	N/A
04	04G	Functional Space 17	Wall Plaster, Brown Coat	NAD	N/A
04	04H	Functional Space 19	Wall Plaster, Brown Coat	NAD	N/A
04	04I	Functional Space 20	Wall Plaster, Brown Coat	NAD	N/A
05	05A	Functional Space 1	Ceiling Deck	NAD	N/A

Bold = Positive for ACM
 NAD = No Asbestos Detected

N/A = Not Applicable
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Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
05	05B	Functional Space 1	Ceiling Deck	NAD	N/A
06	06A	Functional Space 3	1'x1' Ceiling Tile, Textured	NAD	NAD
06	06B	Functional Space 9	1'x1' Ceiling Tile, Textured	NAD	NAD
07	07A	Functional Space 3	1'x1' Ceiling Tile, Textured, Mastic	NAD	NAD
07	07B	Functional Space 9	1'x1' Ceiling Tile, Textured, Mastic	NAD	NAD
08	08A	Functional Space 3	Terrazzo Flooring	NAD	N/A
08	08B	Functional Space 8	Terrazzo Flooring	NAD	N/A
09	09A	Functional Space 3	Interior Brick Mortar	NAD	N/A
09	09B	Functional Space 9	Interior Brick Mortar	NAD	N/A
10	10A	West Exterior Façade	Exterior Window Frame Caulk, Grey	NAD	NAD
10	10B	East Exterior Façade	Exterior Window Frame Caulk, Grey	NAD	<1% Chrysotile
11	11A	West Exterior Façade	Exterior Brick Mortar	NAD	N/A
11	11B	South Exterior Façade	Exterior Brick Mortar	NAD	N/A
12	12A	Functional Space 11	2'x4' Ceiling Tile, Patterned/Pinhole	NAD	NAD
12	12B	Functional Space 11	2'x4' Ceiling Tile, Patterned/Pinhole	NAD	NAD
13	13A	Functional Space 11	1'x1' Ceiling Tile, Pinhole	NAD	NAD
13	13B	Functional Space 11	1'x1' Ceiling Tile, Pinhole	NAD	NAD
14	14A	Functional Space 11	1'x1' Ceiling Tile, Pinhole, Mastic	NAD	NAD
14	14B	Functional Space 11	1'x1' Ceiling Tile, Pinhole, Mastic	NAD	NAD

Bold = Positive for ACM
NAD = No Asbestos Detected

N/A = Not Applicable
NA/PS = Not analyzed/ positive sample



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Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
15	15A	Functional Space 11	Brick Mortar	NAD	N/A
15	15B	Functional Space 11	Brick Mortar	NAD	N/A
16	16A	Functional Space 11	Interior Window Frame Caulk, Grey	NAD	<1% Anthophyllite
16	16B	Functional Space 11	Interior Window Frame Caulk, Grey	NAD	<1% Anthophyllite
17	17A	Functional Space 11	Interior Window Frame Caulk, Beige	NAD	<1% Anthophyllite
17	17B	Functional Space 11	Interior Window Frame Caulk, Beige	NAD	<1% Anthophyllite
18	18A	East Façade	Exterior Stone Window Sill Caulk, Grey	NAD	NAD
18	18B	North Façade	Exterior Stone Window Sill Caulk, Grey	NAD	NAD
19	19A	East Façade	Exterior Brick Mortar (newer)	NAD	N/A
19	19B	East Façade	Exterior Brick Mortar (newer)	NAD	N/A
20	20A	Functional Space 12	Wall Plaster, White Coat	NAD	N/A
20	20B	Functional Space 12	Wall Plaster, White Coat	NAD	N/A
20	20B	Functional Space 12	Wall Plaster, White Coat	NAD	N/A
21	21A	Functional Space 12	Wall Plaster, Brown Coat	NAD	N/A
21	21B	Functional Space 12	Wall Plaster, Brown Coat	NAD	N/A
21	21B	Functional Space 12	Wall Plaster, Brown Coat	NAD	N/A
22	22A	Functional Space 18	Pipe Joint to Fiberglass Pipe Insulation	NAD	N/A
22	22B	Functional Space 18	Pipe Joint to Fiberglass Pipe Insulation	NAD	N/A

Bold = Positive for ACM
NAD = No Asbestos Detected

N/A = Not Applicable
NA/PS = Not analyzed/ positive sample



Final Report For Environmental Inspection Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
22	22C	Functional Space 17	Pipe Joint to Fiberglass Pipe Insulation	NAD	N/A
23	23A	Functional Space 18	Interior Brick Mortar (Foundation Brick)	NAD	N/A
23	23B	Functional Space 19	Interior Brick Mortar (Foundation Brick)	NAD	N/A
24	24A	Functional Space 18	Pipe Gasket	NAD	NAD
24	24B	Functional Space 18	Pipe Gasket	NAD	NAD
25	25A	Functional Space 17	1'x1' Ceiling Tile, Pinhole	NAD	NAD
25	25B	Functional Space 17	1'x1' Ceiling Tile, Pinhole	NAD	NAD
26	26A	Functional Space 17	1'x1' Ceiling Tile, Pinhole, Mastic	NAD	NAD
26	26B	Functional Space 17	1'x1' Ceiling Tile, Pinhole, Mastic	NAD	NAD
27	27A	Functional Space 17	1"x1" Ceiling Tile, Spline	NAD	NAD
27	27B	Functional Space 17	1"x1" Ceiling Tile, Spline	NAD	NAD
28	28A	Functional Space 17	CMU Mortar	NAD	N/A
28	28B	Functional Space 17	CMU Mortar	NAD	N/A
29	29A	East Façade	Caulking to Exterior Stone Window Detailing	NAD	NAD
29	29B	East Façade	Caulking to Exterior Stone Window Detailing	NAD	NAD
30	30A	East Façade, Main Entrance	Putty to Main Entry Door Windows	NAD	<1% Anthophyllite
30	30B	East Façade, Main Entrance	Putty to Main Entry Door Windows	NAD	<1% Anthophyllite
31	31A	South Façade	Exterior Door Frame Caulk, Tan	NAD	NAD
31	31B	South Façade	Exterior Door Frame Caulk, Tan	NAD	NAD
32	32A	West Façade	Exterior Garage Door Frame Caulk, Beige	3.7% CHRYSOTILE	N/A

Bold = Positive for ACM
NAD = No Asbestos Detected

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Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
32	32B	West Façade	Exterior Garage Door Frame Caulk, Beige	NA/PS	N/A
33	33A	West Façade	Exterior Garage Door Frame Caulk, Grey	NAD	NAD
33	33B	West Façade	Exterior Garage Door Frame Caulk, Grey	NAD	<1% Anthophyllite
34	34A	West Façade	Exterior Window Frame Caulk, Off White	NAD	NAD
34	34B	West Façade	Exterior Window Frame Caulk, Off White	NAD	NAD
35	35A	West Façade	Exterior Door Frame Caulk, Cream	NAD	NAD
35	35B	West Façade	Exterior Door Frame Caulk, Cream	NAD	NAD
36	36A	West Façade	Exterior Window Frame Caulk, Tan	NAD	NAD
36	36B	West Façade	Exterior Window Frame Caulk, Tan	NAD	NAD
37	37A	West Façade	Exterior Louver Caulk, Grey	NAD	NAD
37	37B	West Façade	Exterior Louver Caulk, Grey	NAD	NAD
38	38A	Stage Roof	Roof Fabric	NAD	NAD
38	38B	Stage Roof	Roof Fabric	NAD	NAD
39	39A	Stage Roof	Roof Tar	NAD	NAD
39	39B	Stage Roof	Roof Tar	NAD	NAD
40	40A	Stage Roof	Roof Decking	NAD	NAD
40	40B	Stage Roof	Roof Decking	NAD	NAD

Bold = Positive for ACM
NAD = No Asbestos Detected

N/A = Not Applicable
NA/PS = Not analyzed/ positive sample



Final Report for Environmental Inspection Services

APPENDIX B: ASBESTOS BULK SAMPLE FIELD DATA SHEETS WITH CHAIN OF CUSTODY AND LABORATORY RESULTS

**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: 031333041

CustomerID: LOUI56

CustomerPO: 3000828.00

ProjectID:

Attn: **Craig Napolitano**
The Louis Berger Group, Inc.
48 Wall St.
16th Floor
New York, NY 10005

Phone: (212) 612-7900
 Fax:
 Received: 08/21/13 11:00 AM
 Analysis Date: 8/24/2013
 Collected: 8/21/2013

Project: 3000828.00/ WHITE PLANES SCHOOL DISTRICT / H2M/ ROCHAMBEAU SCHOOL WHITE PLAINS, NY / INTERIOR LOCATIONS STAGE

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 01A 031333041-0001		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 2 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		45.00% Ca Carbonate 55.00% 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 01B 031333041-0002		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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 01C 031333041-0003		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 5 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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 01D 031333041-0004		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White	5.00% Glass	55.00% 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 01E 031333041-0005		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	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

Initial Report From 08/25/2013 17:59:24

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EMSL Order: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	01F 031333041-0006	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 15 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White	65.00% 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	01G 031333041-0007	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White	50.00% Ca Carbonate 50.00% 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	01H 031333041-0008	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 19 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White	63.00% 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	01I 031333041-0009	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 20 Heterogeneous		
PLM NYS 198.1 Friable	8/24/2013	White/Yellow	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	02A 031333041-0010	Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 2 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	45.00% Quartz 35.00% 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

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ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	02B	Description	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 3		
	031333041-0011	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Gray		45.00% Quartz 55.00% 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	02C	Description	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 5		
	031333041-0012	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		43.00% Quartz 35.00% 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	02D	Description	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 8		
	031333041-0013	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		46.00% Quartz 35.00% Gypsum 19.00% 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	02E	Description	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 9		
	031333041-0014	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		35.00% Quartz 30.00% 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
Sample ID	02F	Description	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 15		
	031333041-0015	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		42.00% Quartz 38.00% 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

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EMSL Order: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			Asbestos
Test		Color	Fibrous	Non-Fibrous	
Sample ID 02G 031333041-0016		Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		45.00% Quartz 25.00% Gypsum 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 02H 031333041-0017		Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 19 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		40.00% Quartz 37.00% Gypsum 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
Sample ID 02I 031333041-0018		Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 20 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown		52.00% Quartz 48.00% 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 03A 031333041-0019		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 2 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	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 03B 031333041-0020		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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

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EMSL Order: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	03C 031333041-0021	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 5 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	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	03D 031333041-0022	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	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	03E 031333041-0023	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White	52.00% Ca Carbonate 48.00% 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	03F 031333041-0024	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 15 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White	65.00% 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	03G 031333041-0025	Description Homogeneity	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White/Yellow	50.00% Ca Carbonate 50.00% 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

		Non Asbestos			Asbestos
Test		Color	Fibrous	Non-Fibrous	
Sample ID 03H 031333041-0026		Description Homogeneity	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 19 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White/Yellow		35.00% Ca Carbonate 65.00% 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 03I 031333041-0027		Description Homogeneity	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 20 Heterogeneous		
PLM NYS 198.1 Friable	8/24/2013	Tan/White		55.00% Ca Carbonate 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 04A 031333041-0028		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 2 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		43.00% Quartz 35.00% 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 04B 031333041-0029		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		45.00% Quartz 55.00% 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 04C 031333041-0030		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 5 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		48.00% Quartz 25.00% Gypsum 27.00% 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

		Non Asbestos			Asbestos
Test		Color	Fibrous	Non-Fibrous	
Sample ID 04D 031333041-0031		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		52.00% Quartz 25.00% Gypsum 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
Sample ID 04E 031333041-0032		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		45.00% Quartz 15.00% Gypsum 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 04F 031333041-0033		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 15 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	3.00% Hair	45.00% Quartz 52.00% 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 04G 031333041-0034		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		48.00% Quartz 15.00% Gypsum 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 04H 031333041-0035		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 19 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		25.00% Quartz 30.00% Gypsum 30.00% Non-fibrous (other) 15.00% Vermiculite	
Vermiculite > 10% - Analysis via NYS ELAP 198.6 required.					
PLM NYS 198.6 VCM	8/25/2013	Brown			None Detected
This method does not remove vermiculite and may underestimate the level of asbestos present in a samples containing > 10% vermiculite.					
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

Non Asbestos					
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	04I 031333041-0036	Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 20 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Tan	40.00% Quartz 2.00% Mica 58.00% 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	05A 031333041-0037	Description Homogeneity	CEILING DECK - FUNCTIONAL SPACE 1 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Gray/S	4.00% Glass 15.00% Cellulose	65.00% 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
Sample ID	05B 031333041-0038	Description Homogeneity	CEILING DECK - FUNCTIONAL SPACE 1 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray/Silver	3.00% Cellulose	70.00% Gypsum 27.00% 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	06A 031333041-0039	Description Homogeneity	1X1 CEILING TILE TEXTURED - FUNCTIONAL SPACE 3 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray			None Detected
Sample ID	06B 031333041-0040	Description Homogeneity	1X1 CEILING TILE TEXTURED - FUNCTIONAL SPACE 9 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray			None Detected
Sample ID	07A 031333041-0041	Description Homogeneity	1X1 CEILING TILE TEXTURED MASTIC - FUNCTIONAL SPACE 3 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected

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Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	07B 031333041-0042	Description Homogeneity	1X1 CEILING TILE TEXTURED MASTIC - FUNCTIONAL SPACE 9 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		
Sample ID	08A 031333041-0043	Description Homogeneity	TERRAZZO FLOORING - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	5.00% Quartz 95.00% 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	08B 031333041-0044	Description Homogeneity	TERRAZZO FLOORING - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Tan/W	15.00% Ca Carbonate 85.00% 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	09A 031333041-0045	Description Homogeneity	INTERIOR BRICK MORTAR - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	52.00% Quartz 48.00% 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	09B 031333041-0046	Description Homogeneity	INTERIOR BRICK MORTAR - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown	58.00% Quartz 3.00% Mica 39.00% 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	10A 031333041-0047	Description Homogeneity	EXTERIOR WINDOW FRAME CAULK GREY - WEST EXTERIOR FAÇADE Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		

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Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	10B	Description	EXTERIOR WINDOW FRAME CAULK GREY - WEST EXTERIOR FAÇADE		
	031333041-0048	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	<1% Chrysotile <1% Total		
Sample ID	11A	Description	EXTERIOR BRICK MORTAR - WEST EXTERIOR FAÇADE		
	031333041-0049	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Gray	55.00% Quartz 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	11B	Description	EXTERIOR BRICK MORTAR - SOUTH EXTERIOR FAÇADE		
	031333041-0050	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown	55.00% Quartz 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	12A	Description	2X4 CEILING TILE PATTERNED / PINHOLE - FUNCTIONAL SPACE 11		
	031333041-0051	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	White	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	White	None Detected		
Sample ID	12B	Description	2X4 CEILING TILE PATTERNED / PINHOLE - FUNCTIONAL SPACE 11		
	031333041-0052	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	White	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	White	None Detected		
Sample ID	13A	Description	1X1 CEILING TILE PINHOLE - FUNCTIONAL SPACE 11		
	031333041-0053	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		

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Test Report:Asbestos Analysis of Bulk Material

Non Asbestos					
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	13B 031333041-0054	Description Homogeneity	1X1 CEILING TILE PINHOLE - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		
Sample ID	14A 031333041-0055	Description Homogeneity	1X1 CEILING TILE PINHOLE MASTIC - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		
Sample ID	14B 031333041-0056	Description Homogeneity	1X1 CEILING TILE PINHOLE MASTIC - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		
Sample ID	15A 031333041-0057	Description Homogeneity	BRICK MORTAR - FUNCTIONAL SPACE 11 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	48.00% Quartz 52.00% 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	15B 031333041-0058	Description Homogeneity	BRICK MORTAR - FUNCTIONAL SPACE 11 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/White	50.00% Quartz 10.00% 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	16A 031333041-0059	Description Homogeneity	INTERIOR WINDOW FRAME CAULK GREY - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	<1% Anthophyllite <1% Total		

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Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	16B	Description	INTERIOR WINDOW FRAME CAULK GREY - FUNCTIONAL SPACE 11		
	031333041-0060	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	<1% Anthophyllite <1% Total		
Sample ID	17A	Description	INTERIOR WINDOW FRAME CAULK BEIGE - FUNCTIONAL SPACE 11		
	031333041-0061	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Beige	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Beige	<1% Anthophyllite <1% Total		
Sample ID	17B	Description	INTERIOR WINDOW FRAME CAULK BEIGE - FUNCTIONAL SPACE 11		
	031333041-0062	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Beige	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Beige	<1% Anthophyllite <1% Total		
Sample ID	18A	Description	EXTERIOR STONE WINDOW SILL CAULK GREY - EAST FAÇADE		
	031333041-0063	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		
Sample ID	18B	Description	EXTERIOR STONE WINDOW SILL CAULK GREY - NORTH FAÇADE		
	031333041-0064	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		
Sample ID	19A	Description	EXTERIOR BRICK MORTAR NEWER - EAST FAÇADE		
	031333041-0065	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	42.00% Quartz 58.00% 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		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	19B	Description	EXTERIOR BRICK MORTAR NEWER - EAST FAÇADE		
	031333041-0066	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown		60.00% Quartz 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	20A	Description	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 12		
	031333041-0067	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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	20B	Description	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 12		
	031333041-0068	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray/White		35.00% Ca Carbonate 65.00% 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	20C	Description	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 12		
	031333041-0069	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		50.00% Ca Carbonate 50.00% 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	21A	Description	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 12		
	031333041-0070	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	4.00% Hair	55.00% Quartz 41.00% 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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ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	21B 031333041-0071	Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 12 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	<1% Hair	45.00% Quartz 35.00% 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	21C 031333041-0072	Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 12 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown		55.00% Quartz 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	22A 031333041-0073	Description Homogeneity	PIPE JOINT TO FIBERGLASS PIPE INSULATION - FUNCTIONAL SPACE 18 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	55.00% Min. Wool	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	22B 031333041-0074	Description Homogeneity	PIPE JOINT TO FIBERGLASS PIPE INSULATION - FUNCTIONAL SPACE 18 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Gray	52.00% Min. Wool	48.00% 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	22C 031333041-0075	Description Homogeneity	PIPE JOINT TO FIBERGLASS PIPE INSULATION - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown	30.00% Min. Wool	70.00% 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	23A 031333041-0076	Description Homogeneity	INTERIOR BRICK MORTAR (FOUNDATION BRICK) - FUNCTIONAL SPACE 18 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		60.00% Quartz 15.00% Ca Carbonate 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

Initial Report From 08/25/2013 17:59:24

**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: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	23B	Description	INTERIOR BRICK MORTAR (FOUNDATION BRICK) - FUNCTIONAL SPACE 19		
	031333041-0077	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/White/		55.00% Quartz 2.00% Mica 43.00% 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	24A	Description	PIPE GASKET - FUNCTIONAL SPACE 18		
	031333041-0078	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected
Sample ID	24B	Description	PIPE GASKET - FUNCTIONAL SPACE 18		
	031333041-0079	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected
Sample ID	25A	Description	1X1 CEILING TILE PINHOLE - FUNCTIONAL SPACE 17		
	031333041-0080	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected
Sample ID	25B	Description	1X1 CEILING TILE PINHOLE - FUNCTIONAL SPACE 17		
	031333041-0081	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected
Sample ID	26A	Description	1X1 CEILING TILE PINHOLE MASTIC - FUNCTIONAL SPACE 17		
	031333041-0082	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected

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

EMSL Order: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Non Asbestos					
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	26B 031333041-0083	Description Homogeneity	1X1 CEILING TILE PINHOLE MASTIC - FUNCTIONAL SPACE 17 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		
Sample ID	27A 031333041-0084	Description Homogeneity	1X1 CEILING TILE SPLINE - FUNCTIONAL SPACE 17 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		
Sample ID	27B 031333041-0085	Description Homogeneity	1X1 CEILING TILE SPLINE - FUNCTIONAL SPACE 17 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		
Sample ID	28A 031333041-0086	Description Homogeneity	CMU MORTAR - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	60.00% Quartz 10.00% 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	28B 031333041-0087	Description Homogeneity	CMU MORTAR - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown	45.00% Quartz 55.00% 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	29A 031333041-0088	Description Homogeneity	CAULKING TO EXTERIOR STONE WINDOW DETAILING - EAST FAÇADE Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		

**EMSL Analytical, Inc.**

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EMSL Order: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos		
Test		Color	Fibrous	Non-Fibrous
Sample ID	29B	Description	CAULKING TO EXTERIOR STONE WINDOW DETAILING - EAST FAÇADE	
	031333041-0089	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray		None Detected
Sample ID	30A	Description	PUTTY TO MAIN ENTRY DOOR WINDOWS - EAST FAÇADE MAIN ENTRANCE	
	031333041-0090	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray /Red /Beige		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray /Red /Beige		<1% Anthophyllite <1% Total
Sample ID	30B	Description	PUTTY TO MAIN ENTRY DOOR WINDOWS - EAST FAÇADE MAIN ENTRANCE	
	031333041-0091	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray /Red /Beige		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray /Red /Beige		<1% Anthophyllite <1% Total
Sample ID	31A	Description	EXTERIOR DOOR FRAME CAULK TAN - SOUTH FAÇADE	
	031333041-0092	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Tan		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Tan		None Detected
Sample ID	31B	Description	EXTERIOR DOOR FRAME CAULK TAN - SOUTH FAÇADE	
	031333041-0093	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Tan		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Tan		None Detected
Sample ID	32A	Description	EXTERIOR GARAGE DOOR FRAME BEIGE - WEST FAÇADE	
	031333041-0094	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Beige		3.7% Chrysotile 3.7% Total
TEM NYS 198.4 NOB	8/24/2013			Not Analyzed

Initial Report From 08/25/2013 17:59:24

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

EMSL Order: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID 32B 031333041-0095	Description Homogeneity	EXTERIOR GARAGE DOOR FRAME BEIGE - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	8/24/2013				Not Analyzed
Sample ID 33A 031333041-0096	Description Homogeneity	EXTERIOR GARAGE DOOR FRAME GREY - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray			None Detected
Sample ID 33B 031333041-0097	Description Homogeneity	EXTERIOR GARAGE DOOR FAME CAULK GREY - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray			<1% Anthophyllite <1% Total
Sample ID 34A 031333041-0098	Description Homogeneity	EXTERIOR GARAGE FRAME CAULK OFF WHITE - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	White			None Detected
Sample ID 34B 031333041-0099	Description Homogeneity	EXTERIOR GARAGE FRAME CAULK OFF WHITE - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	White			None Detected
Sample ID 35A 031333041-0100	Description Homogeneity	EXTERIOR DOOR FRAME CAULK CREAM - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Cream			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/25/2013	Cream			None Detected

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EMSL Order: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	35B	Description	EXTERIOR DOOR FRAME CAULK CREAM - WEST FAÇADE		
	031333041-0101	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Cream	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Cream	None Detected		
Sample ID	36A	Description	EXTERIOR DOOR FRAME CAULK TAN - WEST FAÇADE		
	031333041-0102	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Tan	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Tan	None Detected		
Sample ID	36B	Description	EXTERIOR DOOR FRAME CAULK TAN - WEST FAÇADE		
	031333041-0103	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Tan	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Tan	None Detected		
Sample ID	37A	Description	EXTERIOR LOUVER CAULK GREY - WEST FAÇADE		
	031333041-0104	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Gray	None Detected		
Sample ID	37B	Description	EXTERIOR LOUVER CAULK GREY - WEST FAÇADE		
	031333041-0105	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Gray	None Detected		
Sample ID	38A	Description	ROOF FABRIC - STAGE ROOF		
	031333041-0106	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Black	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Black	None Detected		

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

EMSL Order: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	38B 031333041-0107	Description Homogeneity	ROOF FABRIC - STAGE ROOF Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Black	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Black	None Detected		
Sample ID	39A 031333041-0108	Description Homogeneity	ROOF TAR - STAGE ROOF Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Black	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Black	None Detected		
Sample ID	39B 031333041-0109	Description Homogeneity	ROOF TAR - STAGE ROOF Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Black	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Black	None Detected		
Sample ID	40A 031333041-0110	Description Homogeneity	ROOF DECKING - STAGE ROOF Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Gray	None Detected		
Sample ID	40B 031333041-0111	Description Homogeneity	ROOF DECKING - STAGE ROOF Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Gray	None Detected		

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EMSL Order: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report: Asbestos Analysis of Bulk Material

Test	Color	Non Asbestos		Asbestos
		Fibrous	Non-Fibrous	

Scope: Leica #8 Ser. 9640013510UN0022

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:

Scope: Leica #8 Ser. 9640013510UN0022

Sample Receipt Date:: 8/21/2013 Sample Receipt Time: 11:00 AM

Analysis Completed Date: 8/24/2013 Analysis Completed Time: 11:49 AM

Analyst(s):

Henry Akintunde PLM NYS 198.1 Friable (47)

Jon Williams PLM NYS 198.1 Friable (14)

Kamel Alawawda PLM NYS 198.6 NOB (49)

Jon Williams PLM NYS 198.6 VCM (1)

Sean Scales TEM NYS 198.4 NOB (48)

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



THE LOUIS BERGER
GROUP, INC.

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 1 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Planes School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 812-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: X 96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
01	01A	Ceiling Plaster, White Coat	Functional Space 2		
01	01B	Ceiling Plaster, White Coat	Functional Space 3		
01	01C	Ceiling Plaster, White Coat	Functional Space 5		
01	01D	Ceiling Plaster, White Coat	Functional Space 8	03/333041	
01	01E	Ceiling Plaster, White Coat	Functional Space 9		
01	01F	Ceiling Plaster, White Coat	Functional Space 15		
01	01G	Ceiling Plaster, White Coat	Functional Space 17		
01	01H	Ceiling Plaster, White Coat	Functional Space 19		
01	01I	Ceiling Plaster, White Coat	Functional Space 20		
02	02A	Ceiling Plaster, Brown Coat	Functional Space 2		
02	02B	Ceiling Plaster, Brown Coat	Functional Space 3		
02	02C	Ceiling Plaster, Brown Coat	Functional Space 5		

CHAIN OF CUSTODY

Relinquished by: Cheskin	Relinquished by: [Signature]	(Date) 8/19/13	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Received by: [Signature]	Received by: [Signature]	(Date) 8/19	(Time) 11am	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

031333041



THE LOUIS BERGER
GROUP, INC.

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 2 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Planes School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: **X** 00 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
02	02D	Ceiling Plaster, Brown Coat	Functional Space 8		
02	02E	Ceiling Plaster, Brown Coat	Functional Space 9		
02	02F	Ceiling Plaster, Brown Coat	Functional Space 15		
02	02G	Ceiling Plaster, Brown Coat	Functional Space 17		
02	02H	Ceiling Plaster, Brown Coat	Functional Space 19		
02	02I	Ceiling Plaster, Brown Coat	Functional Space 20		
03	03A	Wall Plaster, White Coat	Functional Space 2	03333041	
03	03B	Wall Plaster, White Coat	Functional Space 3		
03	03C	Wall Plaster, White Coat	Functional Space 5		
03	03D	Wall Plaster, White Coat	Functional Space 8		
03	03E	Wall Plaster, White Coat	Functional Space 9		
03	03F	Wall Plaster, White Coat	Functional Space 15		

CHAIN OF CUSTODY

Relinquished by: <i>D. Cheskin</i>	(Date) <i>8/19/13</i>	(Time)	Relinquished by: <i>D. Garcia</i>	(Date) <i>8/20/13</i>	(Time) <i>11AM</i>	Relinquished by:	(Date)	(Time)	Relinquished by:	(Date)	(Time)
Received by: <i>D. Napolitano</i>	(Date) <i>8/20/13</i>	(Time)	Received by:	(Date)	(Time)	Received by:	(Date)	(Time)	Received by:	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

03133 3041

	THE LOUIS BERGER GROUP, INC.	<u>ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY</u>	PAGE 3 OF 10
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PROJECT NO.: 3000828.00 CLIENT: White Planes School District/H2M PROJECT SITE: Rochambeau School, White Plains, NY Project Manager: C. Napolitano	LOCATION(S) SURVEYED: Interior Locations, Stage Roof PROPOSED PROJECT: HVAC Upgrades DATE(S) OF INSPECTION: 8/19/13 Inspector(s): Drew Cheskin & Josue Garcia
--	--

THE LOUIS BERGER GROUP, INC. TELEPHONE NO. : (212) 612-7900 FAX NO.: (212) 383-4341 ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005	RESULTS TO: acheskin@louisberger.com cnapolitano@louisberger.com jgarcia@louisberger.com	TURNAROUND TIME: X 96 HR.
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HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
03	03G	Wall Plaster, White Coat	Functional Space 17		
03	03H	Wall Plaster, White Coat	Functional Space 19		
03	03I	Wall Plaster, White Coat	Functional Space 20		
04	04A	Wall Plaster, Brown Coat	Functional Space 2		
04	04B	Wall Plaster, Brown Coat	Functional Space 3		
04	04C	Wall Plaster, Brown Coat	Functional Space 5		
04	04D	Wall Plaster, Brown Coat	Functional Space 8		
04	04E	Wall Plaster, Brown Coat	Functional Space 9		
04	04F	Wall Plaster, Brown Coat	Functional Space 15		
04	04G	Wall Plaster, Brown Coat	Functional Space 17		
04	04H	Wall Plaster, Brown Coat	Functional Space 19		
04	04I	Wall Plaster, Brown Coat	Functional Space 20		

CHAIN OF CUSTODY											
Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Drew Cheskin	[Signature]	8/21/13									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Josue Garcia	[Signature]	8/21	11Am								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

031333041

2

PROJECT NO.: 3000828.00 CLIENT: White Planes School District/H2M PROJECT SITE: Rochambeau School, White Plains, NY Project Manager: C. Napolitano	LOCATION(S) SURVEYED: Interior Locations, Stage Roof PROPOSED PROJECT: HVAC Upgrades DATE(S) OF INSPECTION: 8/19/13 Inspector(s): Drew Cheskin & Josue Garcia
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THE LOUIS BERGER GROUP, INC. TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341 ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005	RESULTS TO: acheskin@louisberger.com cnapolitano@louisberger.com jgarcia@louisberger.com	TURNAROUND TIME: X 96 HR.
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HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
05	05A	Ceiling Deck	Functional Space 1		
05	05B	Ceiling Deck	Functional Space 1		
06	06A	1'x1' Ceiling Tile, Textured	Functional Space 3		
06	06B	1'x1' Ceiling Tile, Textured	Functional Space 9		
07	07A	1'x1' Ceiling Tile, Textured, Mastic	Functional Space 3		
07	07B	1'x1' Ceiling Tile, Textured, Mastic	Functional Space 9		
08	08A	Terrazzo Flooring	Functional Space 3		
08	08B	Terrazzo Flooring	Functional Space 8	0313	33041
09	09A	Interior Brick Mortar	Functional Space 3		
09	09B	Interior Brick Mortar	Functional Space 9		
10	10A	Exterior Window Frame Caulk, Grey	West Exterior Façade		
10	10B	Exterior Window Frame Caulk, Grey	East Exterior Façade		

CHAIN OF CUSTODY											
Relinquished by:	(Date)	(Time)	Relinquished by:	(Date)	(Time)	Relinquished by:	(Date)	(Time)			
D. Cheskin	8/21/13										
Received by:	(Date)	(Time)	Received by:	(Date)	(Time)	Received by:	(Date)	(Time)			
Josue Garcia	8/21	11AM									

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

031333041

	THE LOUIS BERGER GROUP, INC.	ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY	PAGE 5 OF 10
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PROJECT NO.: 3000828.00

CLIENT: White Plains School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
 TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
 ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: **X** 96 HR.


HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
11	11A	Exterior Brick Mortar	West Exterior Façade		
11	11B	Exterior Brick Mortar	South Exterior Façade		
12	12A	2'x4' Ceiling Tile, Patterned/Pinhole	Functional Space 11		
12	12B	2'x4' Ceiling Tile, Patterned/Pinhole	Functional Space 11		
13	13A	1'x1' Ceiling Tile, Pinhole	Functional Space 11		Above 2'x4' CT
13	13B	1'x1' Ceiling Tile, Pinhole	Functional Space 11		Above 2'x4' CT
14	14A	1'x1' Ceiling Tile, Pinhole, Mastic	Functional Space 11		
14	14B	1'x1' Ceiling Tile, Pinhole, Mastic	Functional Space 11		
15	15A	Brick Mortar	Functional Space 11		Old Gymnasium
15	15B	Brick Mortar	Functional Space 11		Old Gymnasium
16	16A	Interior Window Frame Caulk, Grey	Functional Space 11		To Window with A/C Units
16	16B	Interior Window Frame Caulk, Grey	Functional Space 11		To Window with A/C Units

CHAIN OF CUSTODY

Relinquished by: <i>D. Cheskin</i>	(Date) <i>8/21/13</i>	(Time)	Relinquished by: <i>D. Cheskin</i>	(Date)	(Time)	Relinquished by: <i>D. Cheskin</i>	(Date)	(Time)
Received by: <i>J. Napolitano</i>	(Date) <i>8/21/13</i>	(Time)	Received by: <i>J. Napolitano</i>	(Date)	(Time)	Received by: <i>J. Napolitano</i>	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

03133041 031333041





	THE LOUIS BERGER GROUP, INC.	ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY	PAGE 6 OF 10
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PROJECT NO.: 3000828.00 CLIENT: White Planes School District/H2M PROJECT SITE: Rochambeau School, White Plains, NY Project Manager: C. Napolitano	LOCATION(S) SURVEYED: Interior Locations, Stage Roof PROPOSED PROJECT: HVAC Upgrades DATE(S) OF INSPECTION: 8/19/13 Inspector(s): Drew Cheskin & Josue Garcia
--	--

THE LOUIS BERGER GROUP, INC. TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341 ADDRESS: 46 Wall Street 16th Floor, New York, NY 10005	RESULTS TO: acheskin@louisberger.com cnapolitano@louisberger.com jgarcia@louisberger.com	TURNAROUND TIME: X 96 HR.
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HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
17	17A	Interior Window Frame Caulk, Beige —	Functional Space 11		To A/C Units
17	17B	Interior Window Frame Caulk, Beige —	Functional Space 11		To A/C Units
18	18A	Exterior Stone Window Sill Caulk, Grey ✓	East Façade		
18	18B	Exterior Stone Window Sill Caulk, Grey —	North Façade		
19	19A	Exterior Brick Mortar (newer)	East Façade		
19	19B	Exterior Brick Mortar (newer)	East Façade		
20	20A	Wall Plaster, White Coat	Functional Space 12		Auditorium Stage
20	20B	Wall Plaster, White Coat	Functional Space 12		Auditorium Stage
20	20B	Wall Plaster, White Coat	Functional Space 12		Auditorium Stage
21	21A	Wall Plaster, Brown Coat	Functional Space 12		Auditorium Stage
21	21B	Wall Plaster, Brown Coat	Functional Space 12		Auditorium Stage
21	21B	Wall Plaster, Brown Coat	Functional Space 12		Auditorium Stage

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
		8/21/13									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
		8/21	11am								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.



**THE LOUIS BERGER
GROUP, INC.**

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 7 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Planes School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: **X** 96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
22	22A	Pipe Joint to Fiberglass Pipe Insulation	Functional Space 18		
22	22B	Pipe Joint to Fiberglass Pipe Insulation	Functional Space 18		
22	22C	Pipe Joint to Fiberglass Pipe Insulation	Functional Space 17		
23	23A	Interior Brick Mortar (Foundation Brick)	Functional Space 18		
23	23B	Interior Brick Mortar (Foundation Brick)	Functional Space 19		
24	24A	Pipe Gasket ✓	Functional Space 18		
24	24B	Pipe Gasket -	Functional Space 18		
25	25A	1'x1' Ceiling Tile, Pinhole ✓	Functional Space 17		
25	25B	1'x1' Ceiling Tile, Pinhole -	Functional Space 17		
26	26A	1'x1' Ceiling Tile, Pinhole, Mastic ✓	Functional Space 17		
26	26B	1'x1' Ceiling Tile, Pinhole, Mastic ✓	Functional Space 17		
27	27A	1"x1" Ceiling Tile, Spline ✓	Functional Space 17		

031333041

CHAIN OF CUSTODY

Relinquished by: <i>Drew Cheskin</i> (Sign)	(Date) 8/21/13	(Time)	Relinquished by: (Sign)	(Date)	(Time)	Relinquished by: (Sign)	(Date)	(Time)
Received by: <i>Josue Garcia</i> (Sign)	(Date) 8/21	(Time) 11am	Received by: (Sign)	(Date)	(Time)	Received by: (Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.



**THE LOUIS BERGER
GROUP, INC.**

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 8 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Planes School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: X 96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
27	27B	1"x1" Ceiling Tile, Spline —	Functional Space 17		
28	28A	CMU Mortar	Functional Space 17		
28	28B	CMU Mortar	Functional Space 17		
29	29A	Caulking to Exterior Stone Window Detailing —	East Façade		
29	29B	Caulking to Exterior Stone Window Detailing —	East Façade	031333011	
30	30A	Putty to Main Entry Door Windows —	East Façade, Main Entrance		
30	30B	Putty to Main Entry Door Windows —	East Façade, Main Entrance		
31	31A	Exterior Door Frame Caulk, Tan —	South Façade		
31	31B	Exterior Door Frame Caulk, Tan —	South Façade		
32	32A	Exterior Garage Door Frame Caulk, Beige —	West Façade		
32	32B	Exterior Garage Door Frame Caulk, Beige —	West Façade		
33	33A	Exterior Garage Door Frame Caulk, Grey —	West Façade		

CHAIN OF CUSTODY

Relinquished by: <i>Drew Cheskin</i> (Sign)	(Date) 8/21/13	(Time)	Relinquished by: (Sign)	(Date)	(Time)	Relinquished by: (Sign)	(Date)	(Time)
Received by: <i>Josue Garcia</i> (Sign)	(Date) 8/21	(Time) 11 AM	Received by: (Sign)	(Date)	(Time)	Received by: (Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.



**THE LOUIS BERGER
GROUP, INC.**

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 9 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Plains School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: **X** 96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
33	33B	Exterior Garage Door Frame Caulk, Grey —	West Façade		
34	34A	Exterior Window Frame Caulk, Off White —	West Façade		
34	34B	Exterior Window Frame Caulk, Off White —	West Façade		
35	35A	Exterior Door Frame Caulk, Cream —	West Façade		
35	35B	Exterior Door Frame Caulk, Cream —	West Façade		
36	36A	Exterior Window Frame Caulk, Tan —	West Façade		
36	36B	Exterior Window Frame Caulk, Tan —	West Façade		
37	37A	Exterior Louver Caulk, Grey —	West Façade		
37	37B	Exterior Louver Caulk, Grey —	West Façade		
38	38A	Roof Fabric —	Stage Roof		Top Layer, Over Foam
38	38B	Roof Fabric —	Stage Roof		Top Layer, Over Foam
39	39A	Roof Tar —	Stage Roof		Third Layer, Below Foam

CHAIN OF CUSTODY

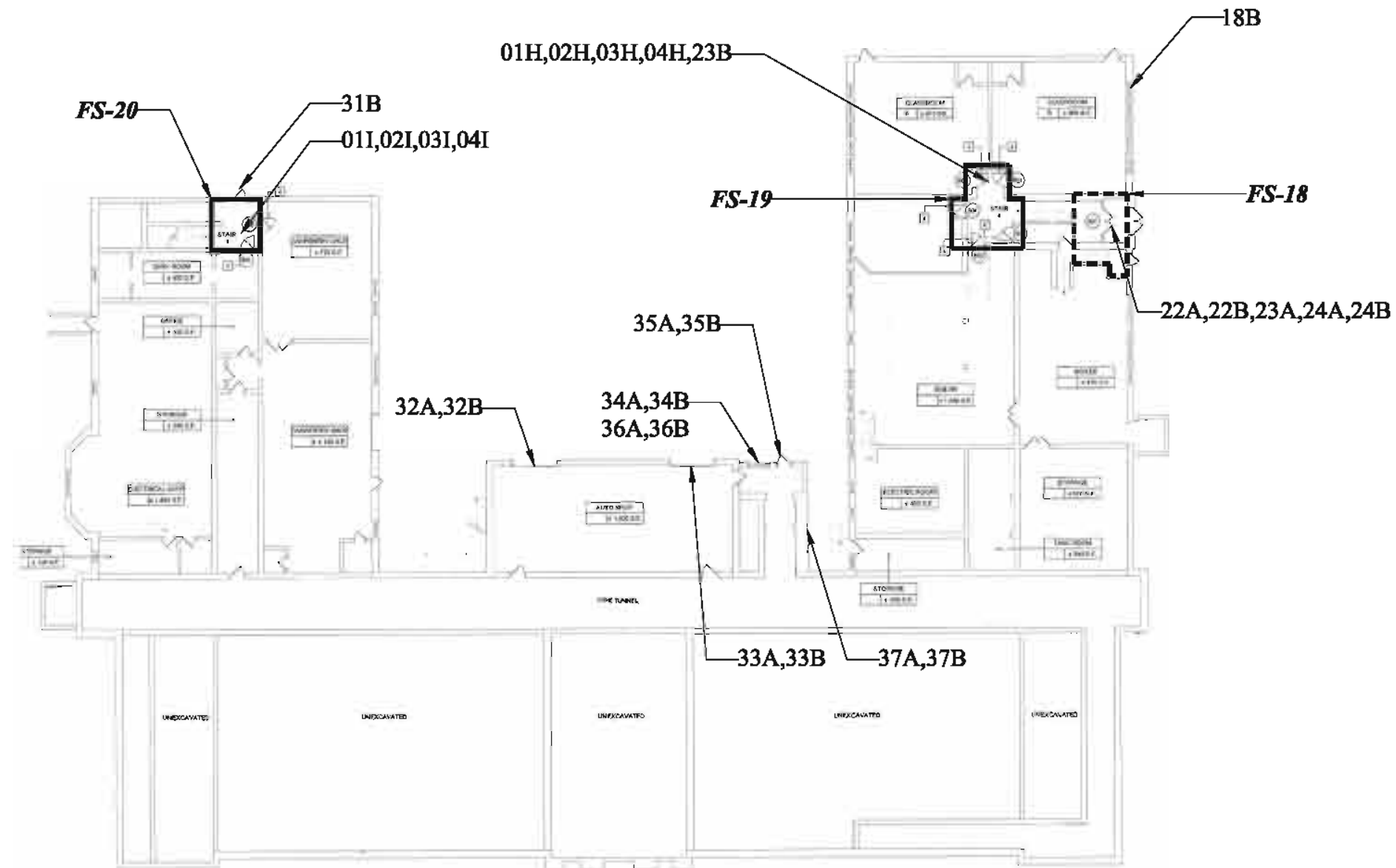
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Received by: <i>Josue Garcia</i>	(Date) <i>8/21</i>	(Time) <i>11AM</i>	Received by: (Sign)	(Date)	(Time)	Received by: (Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.



Final Report for Environmental Inspection Services

APPENDIX C: ASBESTOS BULK SAMPLE LOCATION DRAWINGS



1 BASEMENT FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.812.7800 FAX 212.363.4341 WWW.louisberger.com

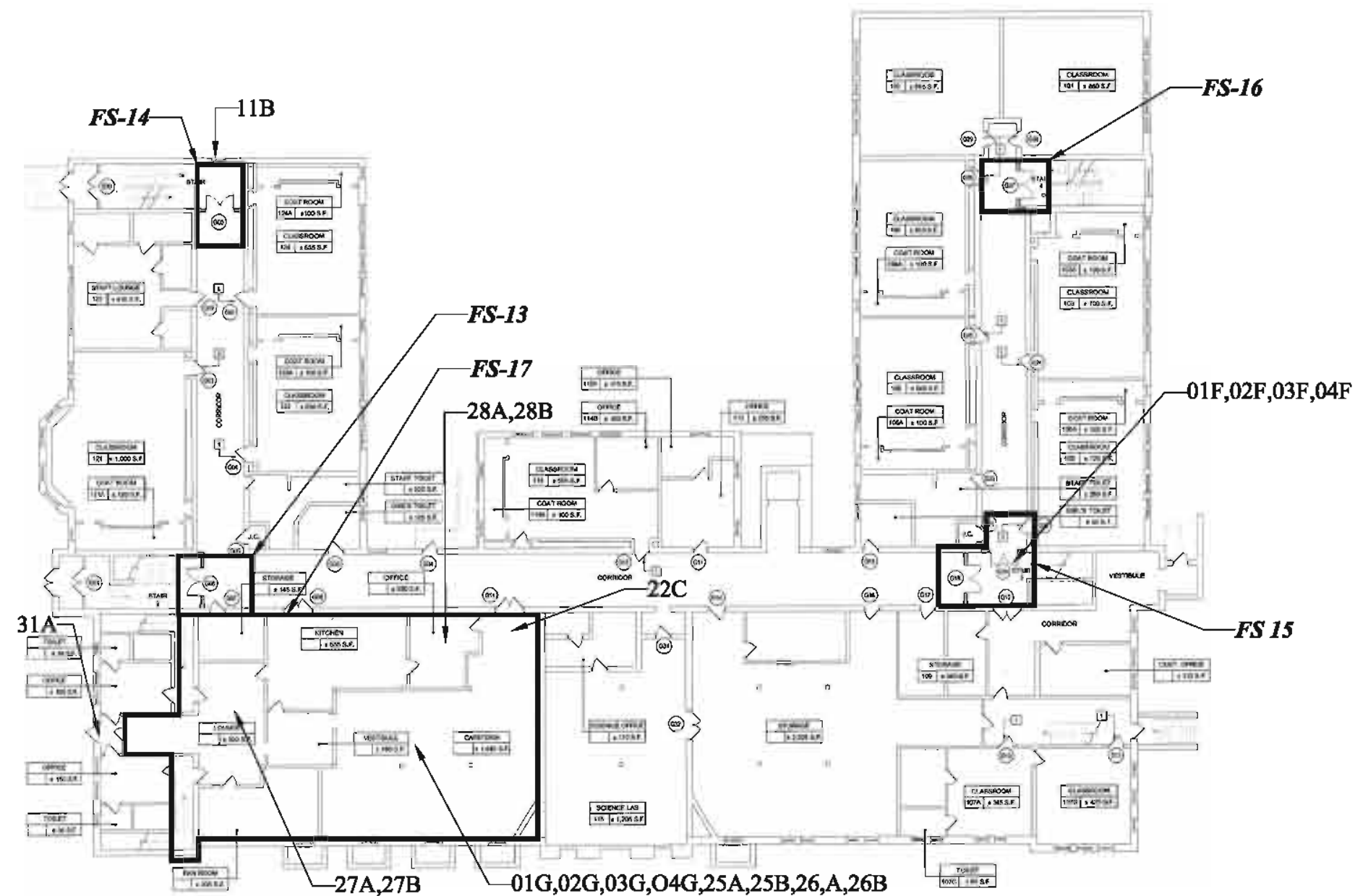


REVISIONS:		
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ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
**BULK SAMPLE LOCATIONS PLAN
BASEMENT**

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 08/08/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER:
	BSL001
	DRAWING NUMBER: 1 OF 5



1 GROUND FLOOR PLAN
SCALE: NTS

KEY PLAN



 **Louis Berger Group, Inc.**
595 Tucker Road
Elmsford, NY 10523
TEL. 212.812.7800 FAX 212.363.4341 WWW.louisberger.com



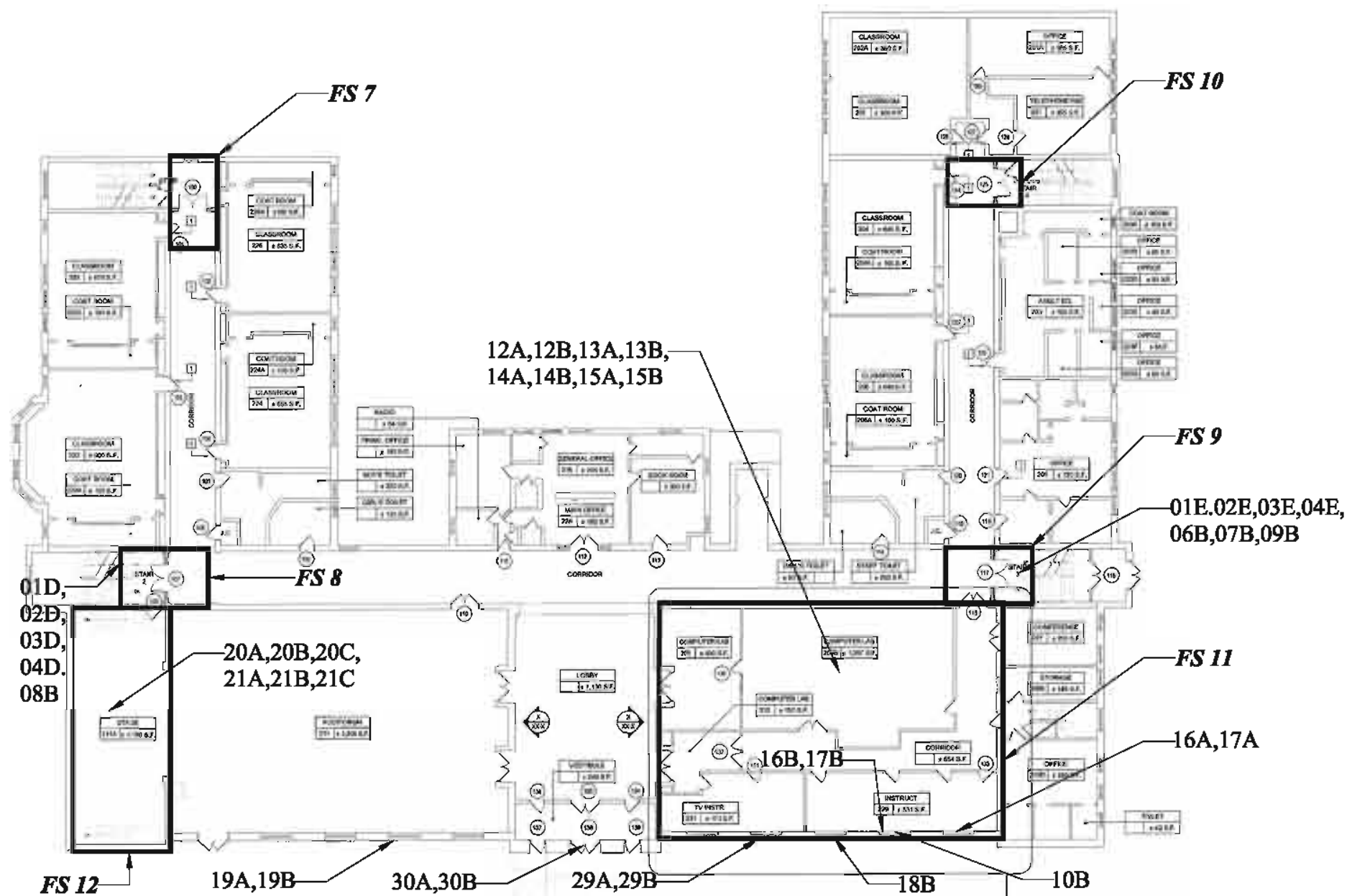
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**ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606**

DRAWING TITLE:
BULK SAMPLE LOCATIONS PLAN
GROUND FLOOR

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESSIN	DATE: 08/06/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER: BSL002 DRAWING NUMBER: 2 OF 5



1 FIRST FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com

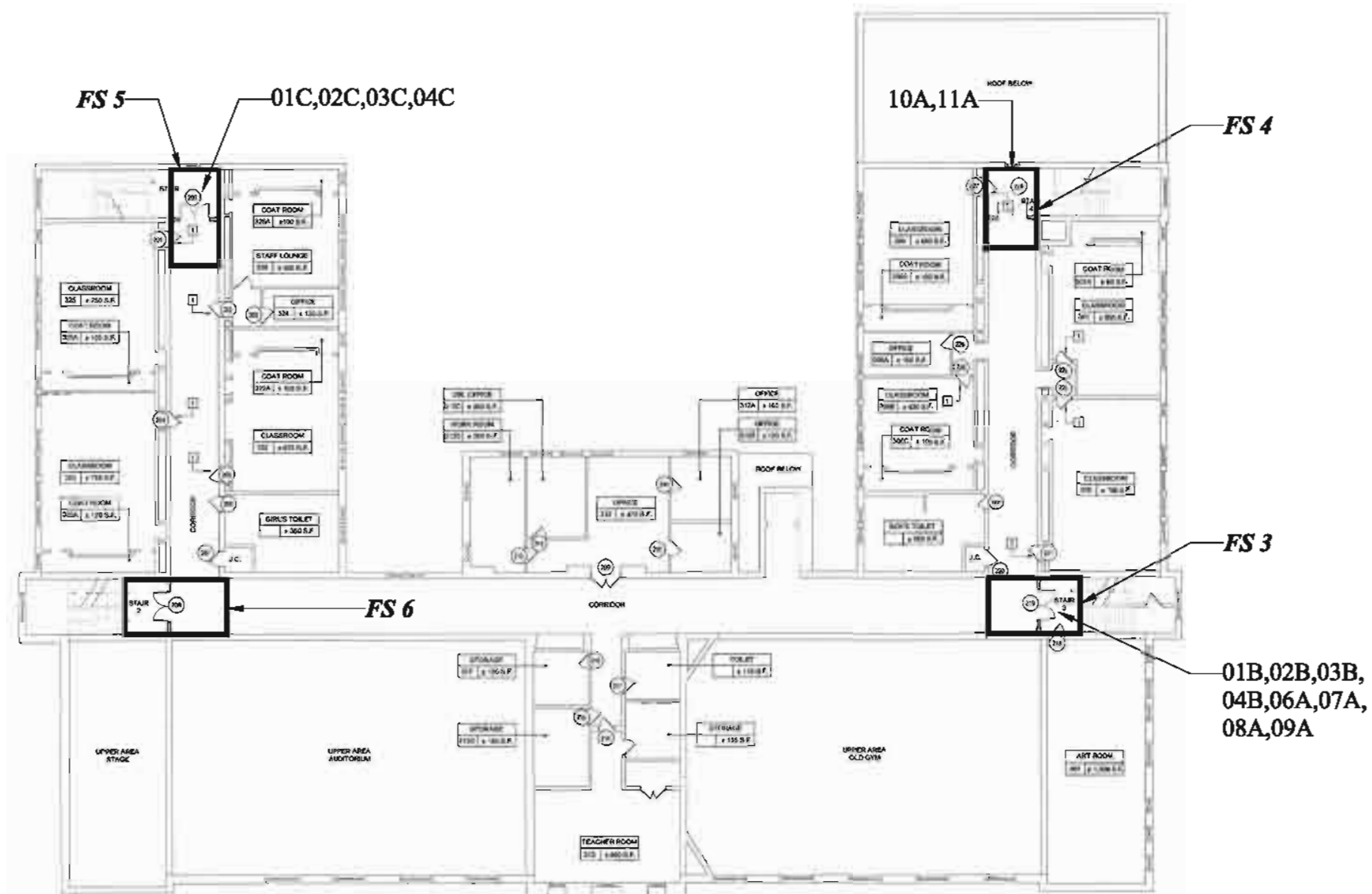


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ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
**BULK SAMPLE LOCATIONS PLAN
FIRST FLOOR**

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 06/06/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER: BSL003
	DRAWING NUMBER: 3 OF 5



1 SECOND FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com

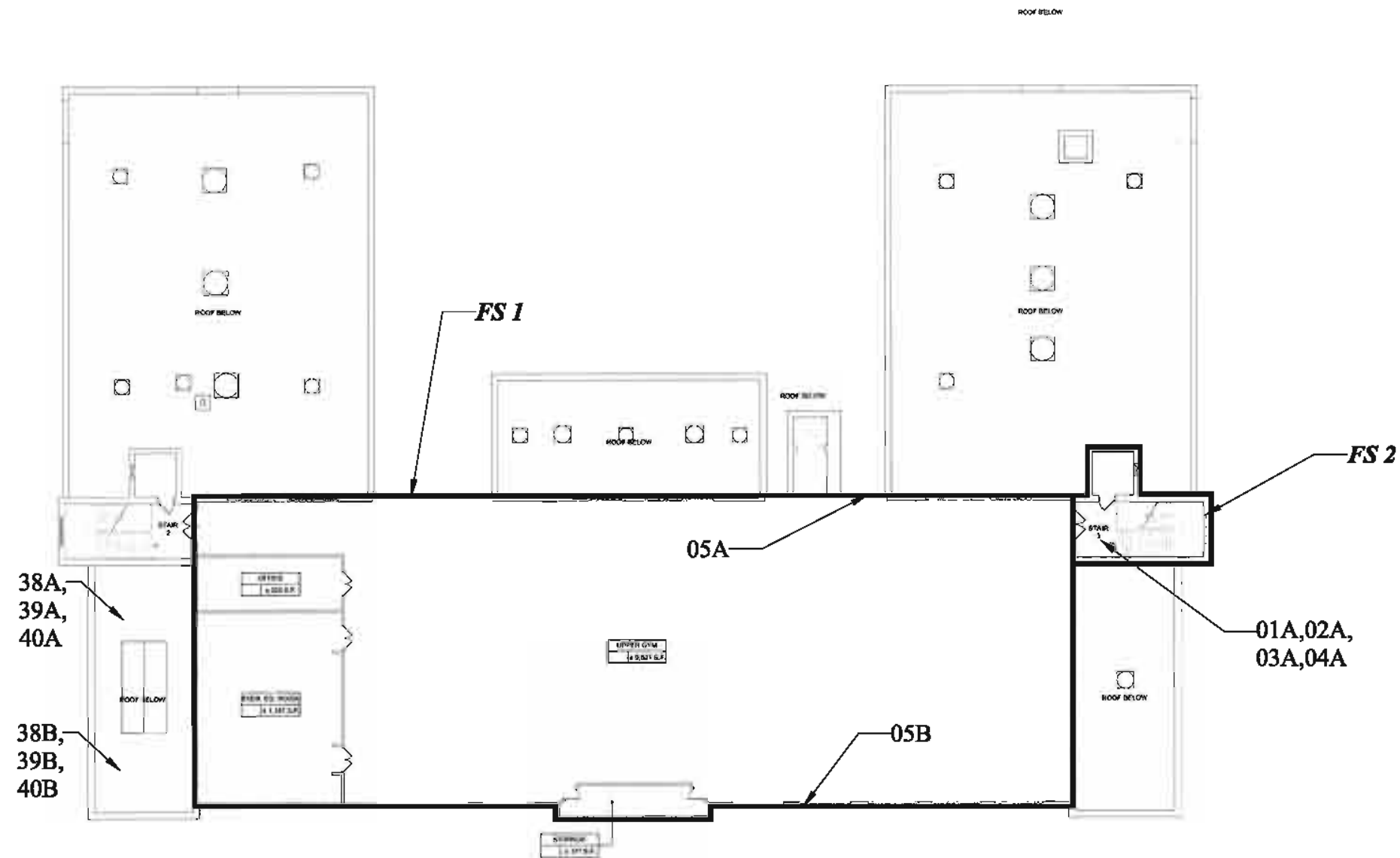


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ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
**BULK SAMPLE LOCATIONS PLAN
SECOND FLOOR**

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 08/08/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER: BSL004
	DRAWING NUMBER: 4 OF 5



1 THIRD FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.812.7800 FAX 212.363.4341 WWW.louisberger.com



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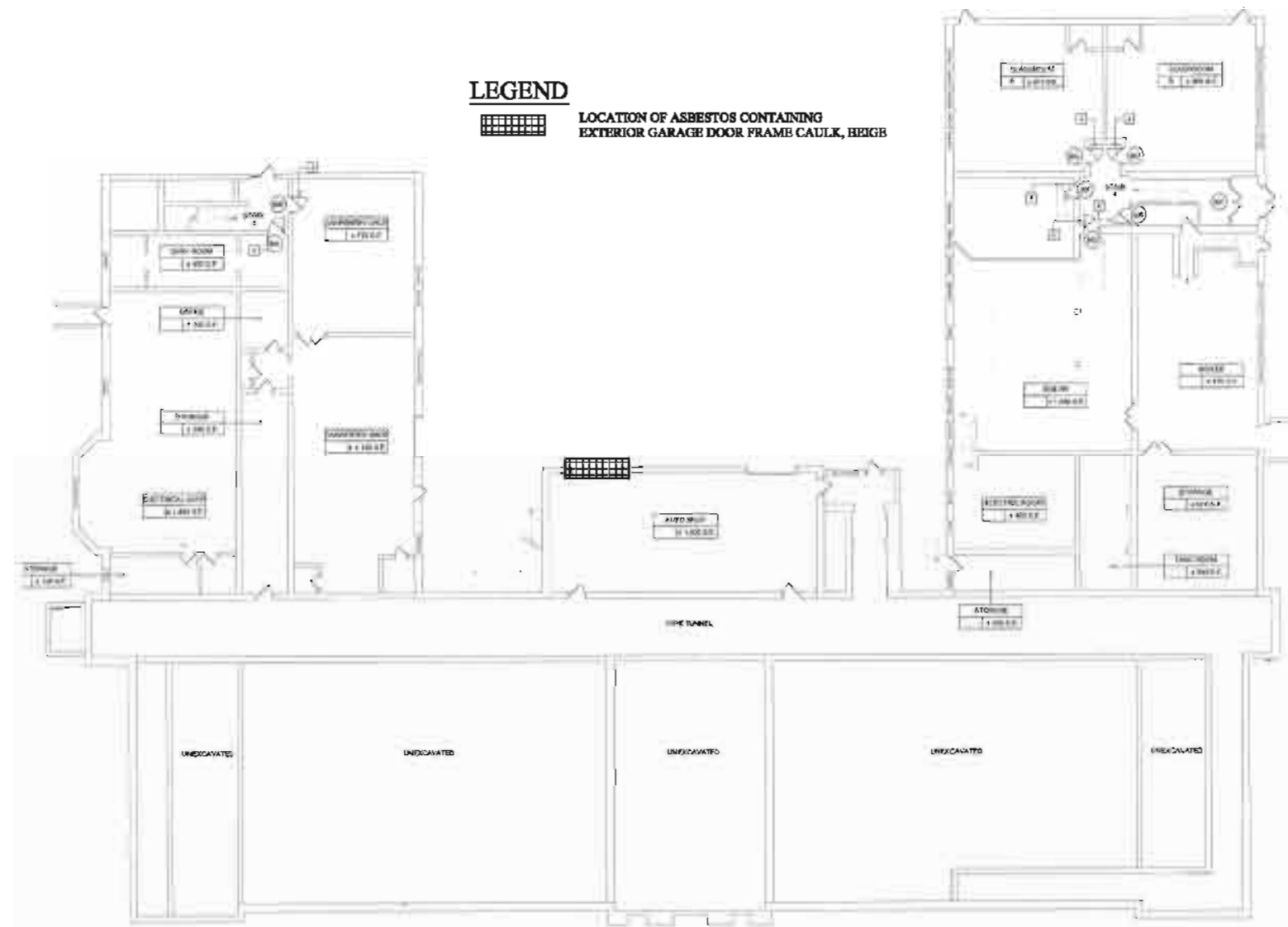
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:	
BULK SAMPLE LOCATIONS PLAN	
THIRD FLOOR	
DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 08/08/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER:
	BSL005
	DRAWING NUMBER:
	5 OF 5



Final Report for Environmental Inspection Services

APPENDIX D: ASBESTOS CONTAINING MATERIALS LOCATION DRAWINGS



1 BASEMENT FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com



REVISIONS:		
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ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
**ASBESTOS CONTAINING MATERIAL
LOCATION PLAN - BASEMENT**

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 08/08/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER: ACM001
	DRAWING NUMBER: 1 OF 1



Final Report for Environmental Inspection Services

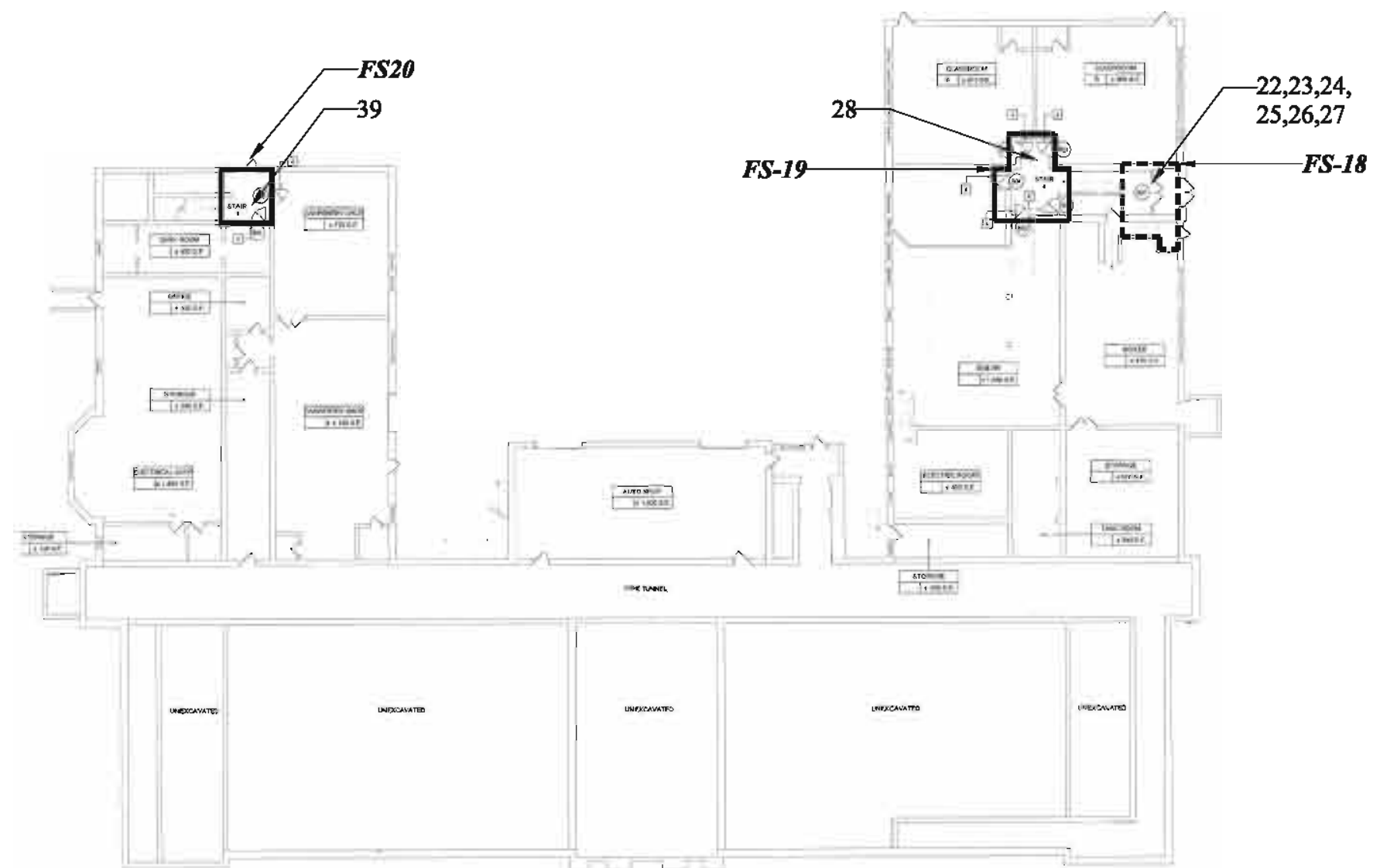
APPENDIX E: LEAD XRF SHOT RESULTS

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12	0.5
13	0.4
14	0.3
15	0.5
16	-0.1
17	0.2
18	0.3
19	>9.9
20	0.3
21	0
22	0.4
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27	2.5
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31	0.3
32	0.3
33	0.2
34	-0.1
35	0.5
36	0.3
37	1
38	-0.1
39	0.3
40	1.2
41	1.1
42	1.1



Final Report for Environmental Inspection Services

APPENDIX F: LEAD XRF SHOT LOCATION DRAWINGS



1 BASEMENT FLOOR PLAN
SCALE: NTS

KEY PLAN



 **Louis Berger Group, Inc.**
595 Tucker Road
Elmsford, NY 10523
TEL 212.812.7800 FAX 212.363.4341 WWW.louisberger.com



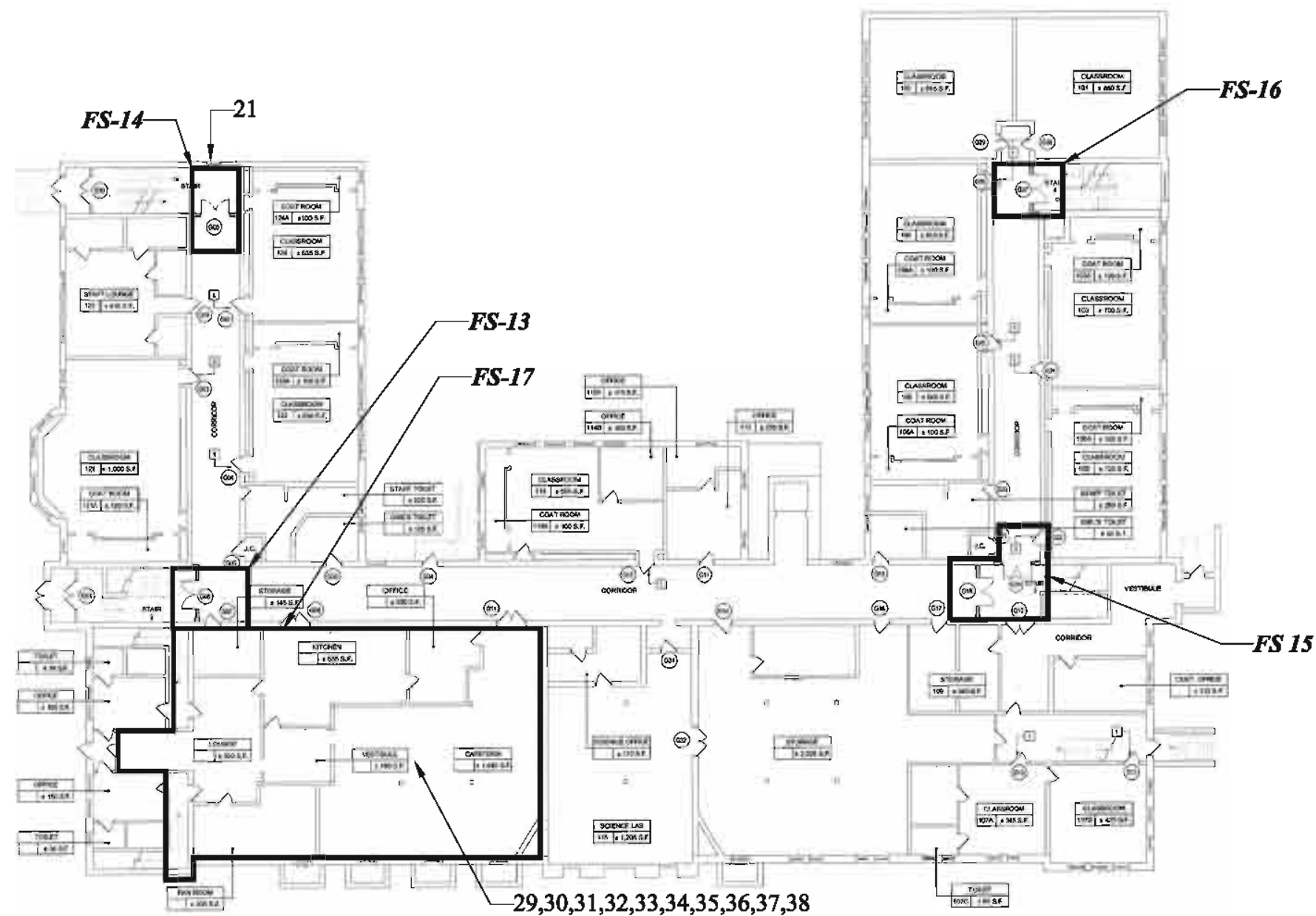
REVISIONS:

NUMBER	DESCRIPTION	DATE
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**ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606**

DRAWING TITLE:
XRF SHOT LOCATIONS PLAN
BASEMENT

DRAWN BY: J. PERKE	SCALE: NOT TO SCALE
INSPECTED BY: A. CHERKIN	DATE: 09/09/2013
CHIEF: C. NAPOLITANO	DRAWING NUMBER: XRF001 DRAWING NUMBER: 1 OF 5



1 **GROUND FLOOR PLAN**
SCALE: NTS

KEY PLAN



 **Louis Berger Group, Inc.**
595 Tucker Road
Elmsford, NY 10523
TEL. 212.812.7800 FAX 212.363.4341 WWW.louisberger.com



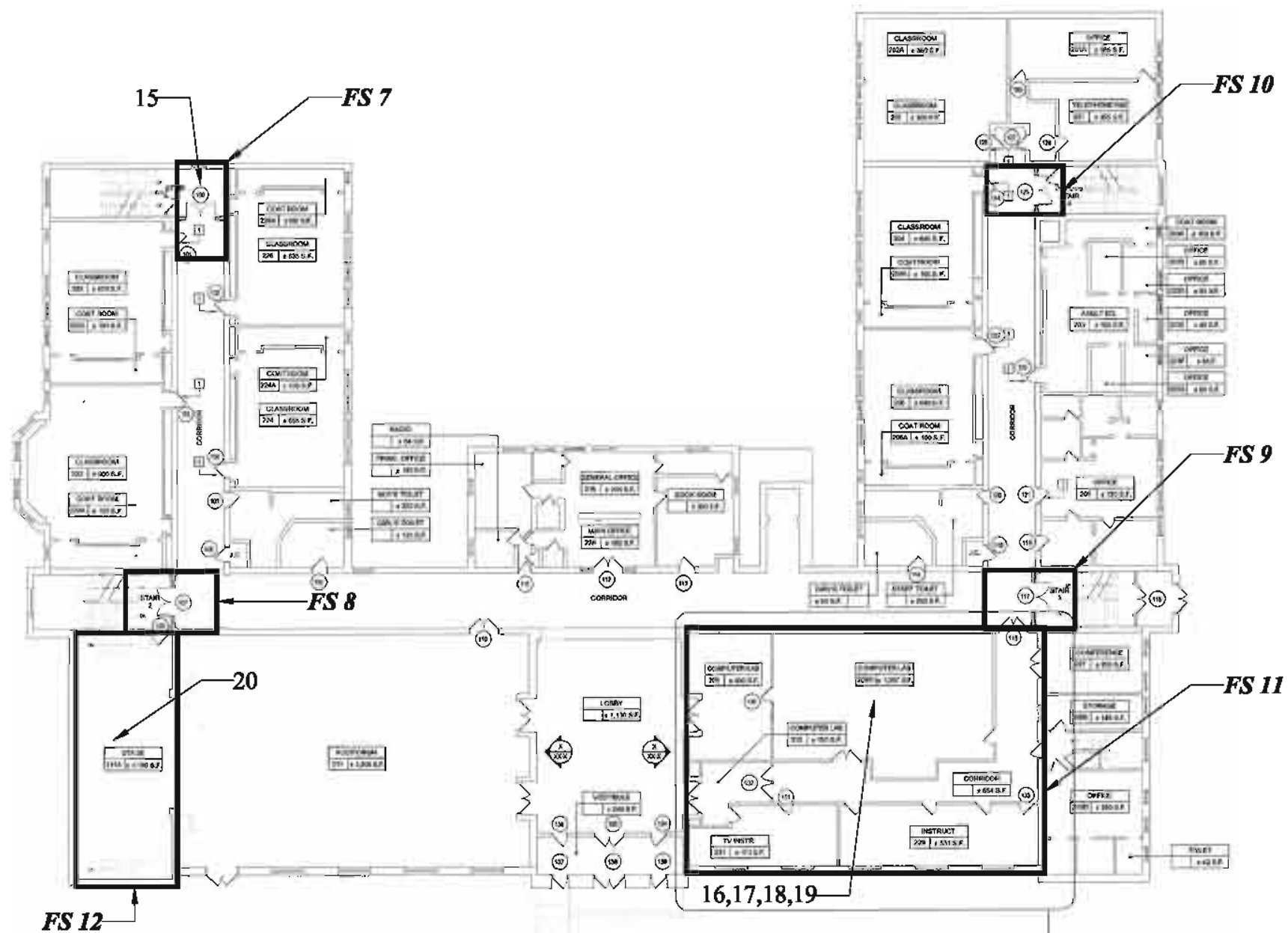
REVISIONS:

NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

**ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606**

DRAWING TITLE:
XRF SHOT LOCATIONS PLAN
GROUND FLOOR

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
SUPERSEDED BY: A. CHESKIN	DATE: 09/08/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER: XRF002
	DRAWING NUMBER: 2 OF 5



1 FIRST FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com

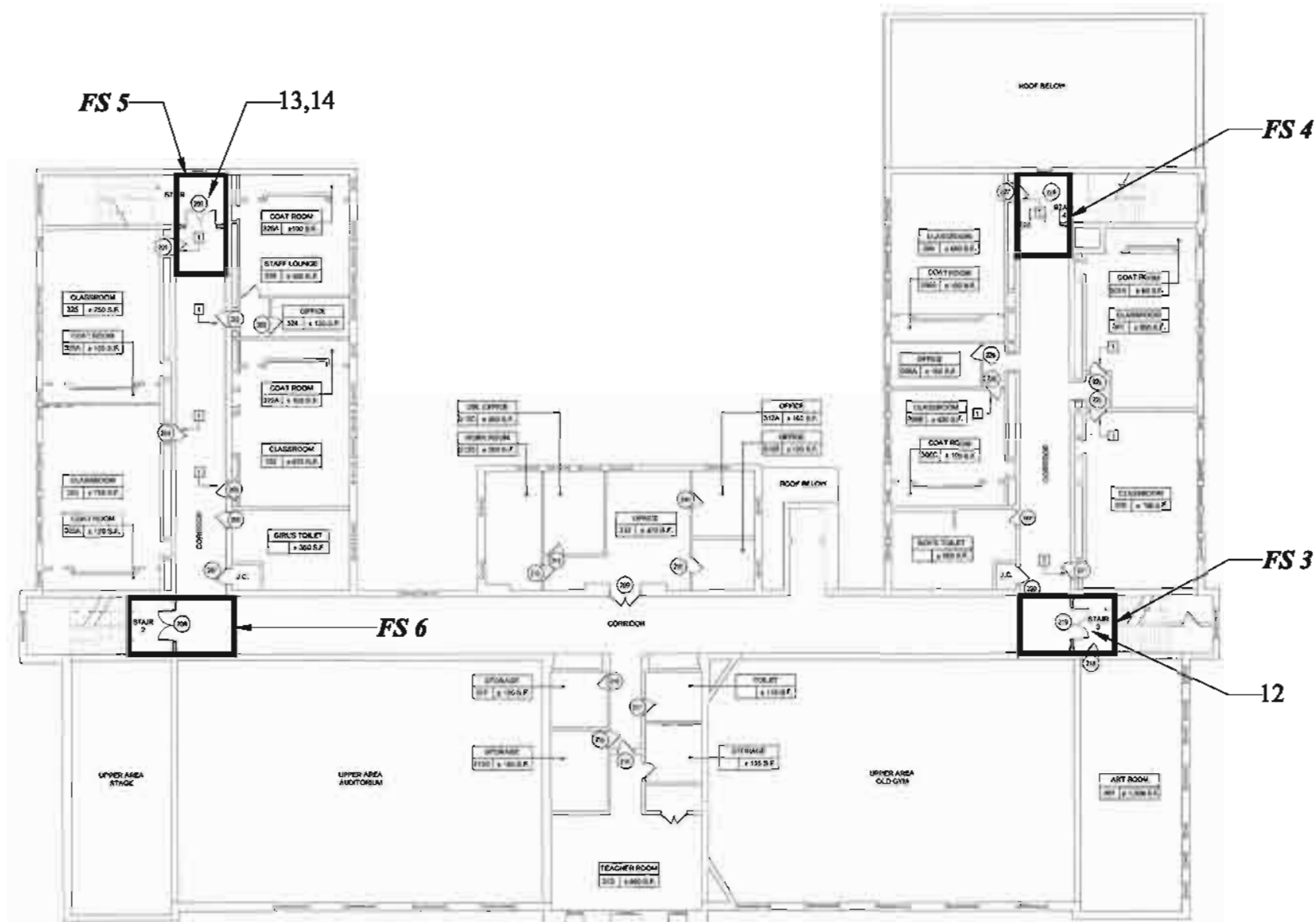


REVISIONS:		
NUMBER	DESCRIPTION	DATE
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4		

ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
**XRF SHOT LOCATIONS PLAN
FIRST FLOOR**

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 09/09/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER: XRF003
	DRAWING NUMBER: 3 OF 5



1 SECOND FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com



REVISIONS:		
NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
XRF SHOT LOCATIONS PLAN
SECOND FLOOR

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHENKIN	DATE: 09/09/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER:
	XRF004
	DRAWING NUMBER:
	4 OF 5



1 THIRD FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com



REVISIONS:		
NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

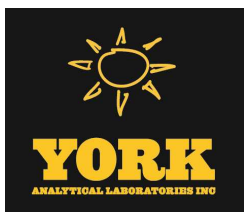
DRAWING TITLE:
XRF SHOT LOCATIONS PLAN
THIRD FLOOR

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 09/09/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER:
	XRF005
	DRAWING NUMBER:
	5 OF 5



Final Report for Environmental Inspection Services

APPENDIX G: PCB BULK SAMPLE FIELD DATA SHEETS WITH CHAIN OF CUSTODY AND LABORATORY RESULTS



Technical Report

prepared for:

Louis Berger & Associates, P.C.

48 Wall Street, 16th Floor

New York NY, 10005

Attention: Craig Napolitano

Report Date: 09/09/2013

Client Project ID: 3000928.00

York Project (SDG) No.: 13I0023

CT Cert. No. PH-0723

New Jersey Cert. No. CT-005



New York Cert. No. 10854

PA Cert. No. 68-04440

Report Date: 09/09/2013
Client Project ID: 3000928.00
York Project (SDG) No.: 13I0023

Louis Berger & Associates, P.C.
48 Wall Street, 16th Floor
New York NY, 10005
Attention: Craig Napolitano

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 August 30, 2013 and listed below. The project was identified as your project: **3000928.00**.

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 Notes 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 attachment to 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.

<u>York Sample ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Collected</u>	<u>Date Received</u>
13I0023-01	01/01A, 01B, 01C	Caulk	08/30/2013	08/30/2013
13I0023-02	02/02A, 02B, 02C	Caulk	08/30/2013	08/30/2013
13I0023-03	03/03A, 03B, 03C	Caulk	08/30/2013	08/30/2013
13I0023-04	04/04A, 04B, 04C	Caulk	08/30/2013	08/30/2013
13I0023-05	05/05A, 05B, 05C	Caulk	08/30/2013	08/30/2013
13I0023-06	06/06A, 06B, 06C	Caulk	08/30/2013	08/30/2013
13I0023-07	07/07A, 07B, 07C	Caulk	08/30/2013	08/30/2013
13I0023-08	08/08A, 08B, 08C	Caulk	08/30/2013	08/30/2013
13I0023-09	09/09A, 09B, 09C	Caulk	08/30/2013	08/30/2013
13I0023-10	10/10A, 10B, 10C	Caulk	08/30/2013	08/30/2013

General Notes for York Project (SDG) No.: 13I0023

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 samples were received in proper condition for analysis with proper documentation, unless otherwise noted.
6. All analyses conducted met method or Laboratory SOP requirements. See the Qualifiers and/or Narrative sections for further information.
7. It is noted that no analyses reported herein were subcontracted to another laboratory, unless noted in the report.
8. This report reflects results that relate only to the samples submitted on the attached chain-of-custody form(s) received by York.

Approved By:



Benjamin Gulizia
Laboratory Director

Date: 09/09/2013

YORK



Sample Information

Client Sample ID: 01/01A, 01B, 01C

York Sample ID: 1310023-01

York Project (SDG) No.

1310023

Client Project ID

3000928.00

Matrix

Caulk

Collection Date/Time

August 30, 2013 12:00 pm

Date Received

08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:26	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:26	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:26	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:26	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:26	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:26	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:26	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:26	JW
Surrogate Recoveries		Result		Acceptance Range							
877-09-8	Surrogate: Tetrachloro-m-xylene	90.5 %		30-140							
2051-24-3	Surrogate: Decachlorobiphenyl	64.7 %		30-140							

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA

Sample Information

Client Sample ID: 02/02A, 02B, 02C

York Sample ID: 1310023-02

York Project (SDG) No.

1310023

Client Project ID

3000928.00

Matrix

Caulk

Collection Date/Time

August 30, 2013 12:00 pm

Date Received

08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:45	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:45	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:45	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:45	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:45	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:45	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:45	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 08:45	JW
Surrogate Recoveries		Result		Acceptance Range							



Sample Information

Client Sample ID: 02/02A, 02B, 02C

York Sample ID: 1310023-02

York Project (SDG) No.
1310023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
877-09-8	Surrogate: Tetrachloro-m-xylene	82.0 %			30-140						
2051-24-3	Surrogate: Decachlorobiphenyl	57.7 %			30-140						

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA

Sample Information

Client Sample ID: 03/03A, 03B, 03C

York Sample ID: 1310023-03

York Project (SDG) No.
1310023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:37	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:37	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:37	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:37	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:37	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:37	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:37	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:37	JW
Surrogate Recoveries		Result		Acceptance Range							
877-09-8	Surrogate: Tetrachloro-m-xylene	98.0 %			30-140						
2051-24-3	Surrogate: Decachlorobiphenyl	66.2 %			30-140						

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA



Sample Information

Client Sample ID: 04/04A, 04B, 04C

York Sample ID: 13I0023-04

York Project (SDG) No.
13I0023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 09:22	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 09:22	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 09:22	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 09:22	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 09:22	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 09:22	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 09:22	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 09:22	JW
Surrogate Recoveries		Result	Acceptance Range								
877-09-8	Surrogate: Tetrachloro-m-xylene	96.0 %	30-140								
2051-24-3	Surrogate: Decachlorobiphenyl	61.2 %	30-140								

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA

Sample Information

Client Sample ID: 05/05A, 05B, 05C

York Sample ID: 13I0023-05

York Project (SDG) No.
13I0023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:56	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:56	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:56	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:56	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:56	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:56	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:56	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 11:56	JW
Surrogate Recoveries		Result	Acceptance Range								



Sample Information

Client Sample ID: 05/05A, 05B, 05C

York Sample ID: 1310023-05

York Project (SDG) No.
1310023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
877-09-8	Surrogate: Tetrachloro-m-xylene	79.0 %			30-140						
2051-24-3	Surrogate: Decachlorobiphenyl	64.2 %			30-140						

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA

Sample Information

Client Sample ID: 06/06A, 06B, 06C

York Sample ID: 1310023-06

York Project (SDG) No.
1310023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:15	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:15	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:15	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:15	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:15	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:15	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:15	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:15	JW
Surrogate Recoveries		Result		Acceptance Range							
877-09-8	Surrogate: Tetrachloro-m-xylene	90.0 %			30-140						
2051-24-3	Surrogate: Decachlorobiphenyl	63.2 %			30-140						

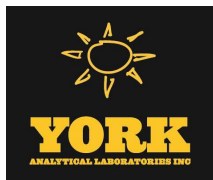
Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA



Sample Information

Client Sample ID: 07/07A, 07B, 07C

York Sample ID: 13I0023-07

York Project (SDG) No.

13I0023

Client Project ID

3000928.00

Matrix

Caulk

Collection Date/Time

August 30, 2013 12:00 pm

Date Received

08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:35	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:35	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:35	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:35	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:35	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:35	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:35	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:35	JW
Surrogate Recoveries		Result		Acceptance Range							
877-09-8	Surrogate: Tetrachloro-m-xylene	98.5 %		30-140							
2051-24-3	Surrogate: Decachlorobiphenyl	67.2 %		30-140							

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA

Sample Information

Client Sample ID: 08/08A, 08B, 08C

York Sample ID: 13I0023-08

York Project (SDG) No.

13I0023

Client Project ID

3000928.00

Matrix

Caulk

Collection Date/Time

August 30, 2013 12:00 pm

Date Received

08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:54	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:54	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:54	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:54	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:54	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:54	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:54	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 12:54	JW
Surrogate Recoveries		Result		Acceptance Range							



Sample Information

Client Sample ID: 08/08A, 08B, 08C

York Sample ID: 1310023-08

York Project (SDG) No.
1310023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
877-09-8	Surrogate: Tetrachloro-m-xylene	95.5 %			30-140						
2051-24-3	Surrogate: Decachlorobiphenyl	60.2 %			30-140						

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA

Sample Information

Client Sample ID: 09/09A, 09B, 09C

York Sample ID: 1310023-09

York Project (SDG) No.
1310023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 13:13	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 13:13	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 13:13	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 13:13	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 13:13	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 13:13	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 13:13	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/03/2013 14:01	09/05/2013 13:13	JW
Surrogate Recoveries		Result		Acceptance Range							
877-09-8	Surrogate: Tetrachloro-m-xylene	94.5 %			30-140						
2051-24-3	Surrogate: Decachlorobiphenyl	62.2 %			30-140						

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:51	09/04/2013 14:52	AA



Sample Information

Client Sample ID: 10/10A, 10B, 10C

York Sample ID: 13I0023-10

York Project (SDG) No.
13I0023

Client Project ID
3000928.00

Matrix
Caulk

Collection Date/Time
August 30, 2013 12:00 pm

Date Received
08/30/2013

Polychlorinated Biphenyls (PCB)

Log-in Notes:

Sample Notes:

Sample Prepared by Method: EPA 3550B

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
12674-11-2	Aroclor 1016	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/04/2013 12:51	09/05/2013 13:32	JW
11104-28-2	Aroclor 1221	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/04/2013 12:51	09/05/2013 13:32	JW
11141-16-5	Aroclor 1232	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/04/2013 12:51	09/05/2013 13:32	JW
53469-21-9	Aroclor 1242	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/04/2013 12:51	09/05/2013 13:32	JW
12672-29-6	Aroclor 1248	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/04/2013 12:51	09/05/2013 13:32	JW
11097-69-1	Aroclor 1254	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/04/2013 12:51	09/05/2013 13:32	JW
11096-82-5	Aroclor 1260	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/04/2013 12:51	09/05/2013 13:32	JW
1336-36-3	Total PCBs	ND		mg/kg dry	0.510	0.510	1	EPA SW 846-8082A	09/04/2013 12:51	09/05/2013 13:32	JW
Surrogate Recoveries		Result		Acceptance Range							
877-09-8	Surrogate: Tetrachloro-m-xylene	60.0 %		30-140							
2051-24-3	Surrogate: Decachlorobiphenyl	46.8 %		30-140							

Total Solids

Log-in Notes:

Sample Notes:

Sample Prepared by Method: % Solids Prep

CAS No.	Parameter	Result	Flag	Units	MDL	RL	Dilution	Reference Method	Date/Time Prepared	Date/Time Analyzed	Analyst
solids	% Solids	100		%	0.100	0.100	1	SM 2540G	09/04/2013 14:53	09/04/2013 14:54	AA



Analytical Batch Summary

Batch ID: BI30040

Preparation Method: EPA 3550B

Prepared By: SA

YORK Sample ID	Client Sample ID	Preparation Date
13I0023-01	01/01A, 01B, 01C	09/03/13
13I0023-02	02/02A, 02B, 02C	09/03/13
13I0023-03	03/03A, 03B, 03C	09/03/13
13I0023-04	04/04A, 04B, 04C	09/03/13
13I0023-05	05/05A, 05B, 05C	09/03/13
13I0023-06	06/06A, 06B, 06C	09/03/13
13I0023-07	07/07A, 07B, 07C	09/03/13
13I0023-08	08/08A, 08B, 08C	09/03/13
13I0023-09	09/09A, 09B, 09C	09/03/13
BI30040-BLK1	Blank	09/03/13
BI30040-BS1	LCS	09/03/13
BI30040-BSD1	LCS Dup	09/03/13

Batch ID: BI30063

Preparation Method: EPA 3550B

Prepared By: CM

YORK Sample ID	Client Sample ID	Preparation Date
13I0023-10	10/10A, 10B, 10C	09/04/13
BI30063-BLK1	Blank	09/04/13
BI30063-BS1	LCS	09/04/13
BI30063-BSD1	LCS Dup	09/04/13

Batch ID: BI30107

Preparation Method: % Solids Prep

Prepared By: AA

YORK Sample ID	Client Sample ID	Preparation Date
13I0023-01	01/01A, 01B, 01C	09/04/13
13I0023-02	02/02A, 02B, 02C	09/04/13
13I0023-03	03/03A, 03B, 03C	09/04/13
13I0023-04	04/04A, 04B, 04C	09/04/13
13I0023-05	05/05A, 05B, 05C	09/04/13
13I0023-06	06/06A, 06B, 06C	09/04/13
13I0023-07	07/07A, 07B, 07C	09/04/13
13I0023-08	08/08A, 08B, 08C	09/04/13
13I0023-09	09/09A, 09B, 09C	09/04/13

Batch ID: BI30109

Preparation Method: % Solids Prep

Prepared By: AA

YORK Sample ID	Client Sample ID	Preparation Date
13I0023-10	10/10A, 10B, 10C	09/04/13



Polychlorinated Biphenyls (PCB) by EPA SW 846-8082/EPA Compendium Methods - Quality Control Data

York Analytical Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
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Batch BI30040 - EPA 3550B

Blank (BI30040-BLK1)

Prepared: 09/03/2013 Analyzed: 09/05/2013

Aroclor 1016	ND	0.0170	mg/kg wet								
Aroclor 1221	ND	0.0170	"								
Aroclor 1232	ND	0.0170	"								
Aroclor 1242	ND	0.0170	"								
Aroclor 1248	ND	0.0170	"								
Aroclor 1254	ND	0.0170	"								
Aroclor 1260	ND	0.0170	"								
Total PCBs	ND	0.0170	"								
<i>Surrogate: Tetrachloro-m-xylene</i>	<i>0.0633</i>		<i>"</i>	<i>0.0667</i>		<i>95.0</i>	<i>30-140</i>				
<i>Surrogate: Decachlorobiphenyl</i>	<i>0.0440</i>		<i>"</i>	<i>0.0670</i>		<i>65.7</i>	<i>30-140</i>				

LCS (BI30040-BS1)

Prepared: 09/03/2013 Analyzed: 09/05/2013

Aroclor 1016	0.318	0.0170	mg/kg wet	0.333		95.3	40-130				
Aroclor 1260	0.285	0.0170	"	0.333		85.6	40-130				
<i>Surrogate: Tetrachloro-m-xylene</i>	<i>0.0533</i>		<i>"</i>	<i>0.0667</i>		<i>80.0</i>	<i>30-140</i>				
<i>Surrogate: Decachlorobiphenyl</i>	<i>0.0360</i>		<i>"</i>	<i>0.0670</i>		<i>53.7</i>	<i>30-140</i>				

LCS Dup (BI30040-BSD1)

Prepared: 09/03/2013 Analyzed: 09/05/2013

Aroclor 1016	0.293	0.0170	mg/kg wet	0.333		87.9	40-130	8.14	25		
Aroclor 1260	0.255	0.0170	"	0.333		76.6	40-130	11.1	25		
<i>Surrogate: Tetrachloro-m-xylene</i>	<i>0.0487</i>		<i>"</i>	<i>0.0667</i>		<i>73.0</i>	<i>30-140</i>				
<i>Surrogate: Decachlorobiphenyl</i>	<i>0.0320</i>		<i>"</i>	<i>0.0670</i>		<i>47.8</i>	<i>30-140</i>				

Batch BI30063 - EPA 3550B

Blank (BI30063-BLK1)

Prepared: 09/04/2013 Analyzed: 09/05/2013

Aroclor 1016	ND	0.0170	mg/kg wet								
Aroclor 1221	ND	0.0170	"								
Aroclor 1232	ND	0.0170	"								
Aroclor 1242	ND	0.0170	"								
Aroclor 1248	ND	0.0170	"								
Aroclor 1254	ND	0.0170	"								
Aroclor 1260	ND	0.0170	"								
Total PCBs	ND	0.0170	"								
<i>Surrogate: Tetrachloro-m-xylene</i>	<i>0.0717</i>		<i>"</i>	<i>0.0667</i>		<i>108</i>	<i>30-140</i>				
<i>Surrogate: Decachlorobiphenyl</i>	<i>0.0547</i>		<i>"</i>	<i>0.0670</i>		<i>81.6</i>	<i>30-140</i>				



Polychlorinated Biphenyls (PCB) by EPA SW 846-8082/EPA Compendium Methods - Quality Control Data

York Analytical Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source* Result	%REC	%REC Limits	Flag	RPD	RPD Limit	Flag
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Batch BI30063 - EPA 3550B

LCS (BI30063-BS1)

Prepared: 09/04/2013 Analyzed: 09/05/2013

Aroclor 1016	0.357	0.0170	mg/kg wet	0.333		107	40-130				
Aroclor 1260	0.327	0.0170	"	0.333		98.1	40-130				
<i>Surrogate: Tetrachloro-m-xylene</i>	<i>0.0717</i>		<i>"</i>	<i>0.0667</i>		<i>108</i>	<i>30-140</i>				
<i>Surrogate: Decachlorobiphenyl</i>	<i>0.0510</i>		<i>"</i>	<i>0.0670</i>		<i>76.1</i>	<i>30-140</i>				

LCS Dup (BI30063-BSD1)

Prepared: 09/04/2013 Analyzed: 09/05/2013

Aroclor 1016	0.285	0.0170	mg/kg wet	0.333		85.4	40-130		22.6	25	
Aroclor 1260	0.273	0.0170	"	0.333		82.0	40-130		17.9	25	
<i>Surrogate: Tetrachloro-m-xylene</i>	<i>0.0523</i>		<i>"</i>	<i>0.0667</i>		<i>78.5</i>	<i>30-140</i>				
<i>Surrogate: Decachlorobiphenyl</i>	<i>0.0397</i>		<i>"</i>	<i>0.0670</i>		<i>59.2</i>	<i>30-140</i>				



Notes and Definitions

ND	Analyte NOT DETECTED at the stated Reporting Limit (RL) or above.
RL	REPORTING LIMIT - the minimum reportable value based upon the lowest point in the analyte calibration curve.
MDL	METHOD DETECTION LIMIT - the minimum concentration that can be measured and reported with a 99% confidence that the concentration is greater than zero. If requested or required, a value reported below the RL and above the MDL is considered estimated and is noted with a "J" flag.
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 MDL, with values between the MDL and the RL being "J" flagged as estimated results.



THE LOUIS BERGER
GROUP, INC.

PCB SURVEY DATA SHEET / CHAIN OF CUSTODY

13I0023
PAGE 1 OF 3

PROJECT NO.: 3000928.00

CLIENT: H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: Craig Napolitano

LOCATION(S) SURVEYED: Interior & Exterior Locations

PROPOSED PROJECT: Renovations

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Marvin Luccioni

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: 5-Day

LAB SAMPLE No.	HA	SAMPLE NO.	SAMPLE DATE/ TIME	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
	01	01A		Exterior Window Frame Caulk, Grey	West Exterior Façade		HM ACM 10
	01	01B		Exterior Window Frame Caulk, Grey	West Exterior Façade		HM ACM 10
	01	01C		Exterior Window Frame Caulk, Grey	East Exterior Façade		HM ACM 10
	02	02A		Interior Window Frame Caulk, Grey	Functional Space 11		HM ACM 16
	02	02B		Interior Window Frame Caulk, Grey	Functional Space 11		HM ACM 16
	02	02C		Interior Window Frame Caulk, Grey	Functional Space 11		HM ACM 16
	03	03A		Interior Window Frame Caulk, Beige	Functional Space 11		HM ACM 17
	03	03B		Interior Window Frame Caulk, Beige	Functional Space 11		HM ACM 17
	03	03C		Interior Window Frame Caulk, Beige	Functional Space 11		HM ACM 17
	04	04A		Exterior Stone Window Sill Caulk, Grey	East Façade		HM ACM 18
	04	04B		Exterior Stone Window Sill Caulk, Grey	East Façade		HM ACM 18
	04	04C		Exterior Stone Window Sill Caulk, Grey	North Façade		HM ACM 18

CHAIN OF CUSTODY

Relinquished by: <i>D. Cheskin</i> (Sign)	(Date) <i>8/30/13</i>	(Time) <i>13:37</i>	Relinquished by: (Sign)	(Date)	(Time)	Relinquished by: (Sign)	(Date)	(Time)
Received by: <i>T. Gabrielson</i> (Sign)	(Date) <i>8/30/13</i>	(Time) <i>14:22</i>	Received by: (Sign)	(Date)	(Time)	Received by: <i>P. Grace</i> (Sign)	(Date) <i>8-30-13</i>	(Time) <i>1900</i>

LAB INSTRUCTIONS: create one (1) composite sample of each homogeneous material from equal mass portions ($\pm 5\%$) of the three (3) sub-samples for extraction and analysis via EPA Method 8082 and report the Aroclors listed (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260). The laboratory shall target a PCB detection limit of 1 ppm



THE LOUIS BERGER
GROUP, INC.

PCB SURVEY DATA SHEET / CHAIN OF CUSTODY

1310023

PAGE 2 OF 3

PROJECT NO.: 3000928.00

CLIENT: H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: Craig Napolitano

LOCATION(S) SURVEYED: Interior & Exterior Locations

PROPOSED PROJECT: Renovations

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Marvin Luccioni

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

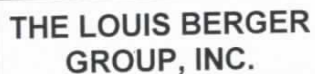
TURNAROUND TIME: 5-Day

LAB SAMPLE No.	HA	SAMPLE NO.	SAMPLE DATE/ TIME	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
	05	05A		Exterior Door Frame Caulk, Tan	South Façade		HM ACM 31
	05	05B		Exterior Door Frame Caulk, Tan	South Façade		HM ACM 31
	05	05C		Exterior Door Frame Caulk, Tan	South Façade		HM ACM 31
	06	06A		Exterior Garage Door Frame Caulk, Grey	West Façade		HM ACM 33
	06	06B		Exterior Garage Door Frame Caulk, Grey	West Façade		HM ACM 33
	06	06C		Exterior Garage Door Frame Caulk, Grey	West Façade		HM ACM 33
	07	07A		Exterior Window Frame Caulk, Off White	West Façade		HM ACM 34
	07	07B		Exterior Window Frame Caulk, Off White	West Façade		HM ACM 34
	07	07C		Exterior Window Frame Caulk, Off White	West Façade		HM ACM 34
	08	08A		Exterior Door Frame Caulk, Cream	West Façade		HM ACM 35
	08	08B		Exterior Door Frame Caulk, Cream	West Façade		HM ACM 35
	08	08C		Exterior Door Frame Caulk, Cream	West Façade		HM ACM 35

CHAIN OF CUSTODY

Relinquished by: <i>D. Cheskin</i> (Sign)	(Date) <i>8/30/13</i>	(Time) <i>1337</i>	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Received by: <i>T. Gabrielson</i> (Sign)	(Date) <i>8/30/13</i>	(Time) <i>1422</i>	Received by:	(Sign)	(Date)	(Time)	Received by: <i>P. GRACE</i> (Sign)	(Date) <i>8-30-13</i>	(Time) <i>1900</i>	

LAB INSTRUCTIONS: create one (1) composite sample of each homogeneous material from equal mass portions ($\pm 5\%$) of the three (3) sub-samples for extraction and analysis via EPA Method 8082 and report the Aroclors listed (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260). The laboratory shall target a PCB detection limit of 1 ppm



13I0023

PAGE 3 OF 3

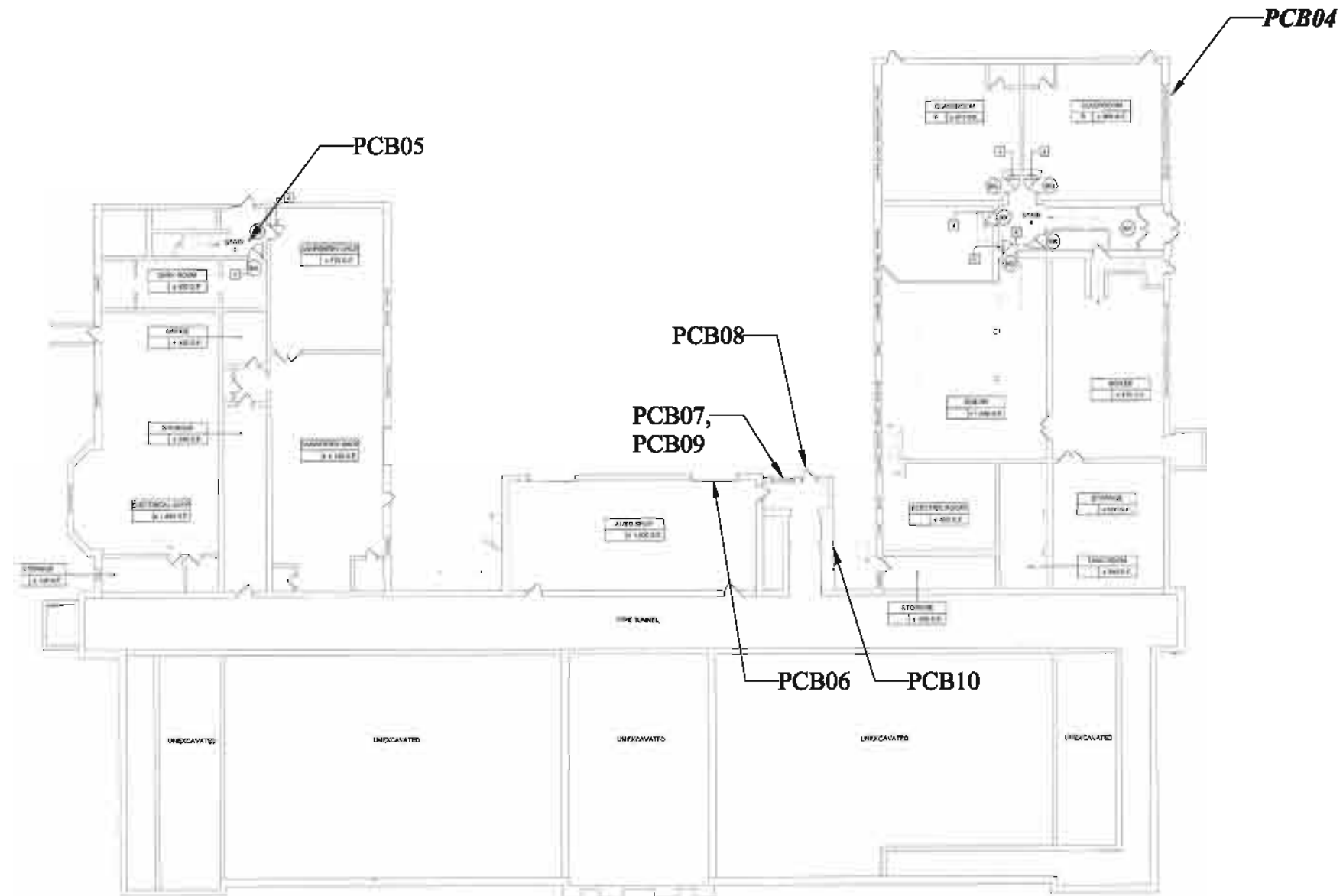
Received by: T. Sabre (Signature) 8/3/13 (Date) 1422 (Time) Received by: T. Sabre (Signature) 8/3/13 (Date) 1422 (Time)

LAB INSTRUCTIONS: create one (1) composite sample of each homogeneous material from equal mass portions ($\pm 5\%$) of the three (3) sub-samples for extraction and analysis via EPA Method 8082 and report the Arochlors listed (Arochlor 1016, Arochlor 1221, Arochlor 1232, Arochlor 1242, Arochlor 1248, Arochlor 1254, Arochlor 1260). The laboratory shall target a PCB detection limit of 1 ppm



Final Report for Environmental Inspection Services

APPENDIX H: PCB BULK SAMPLE LOCATION DRAWINGS



KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.812.7800 FAX 212.363.4341 WWW.louisberger.com

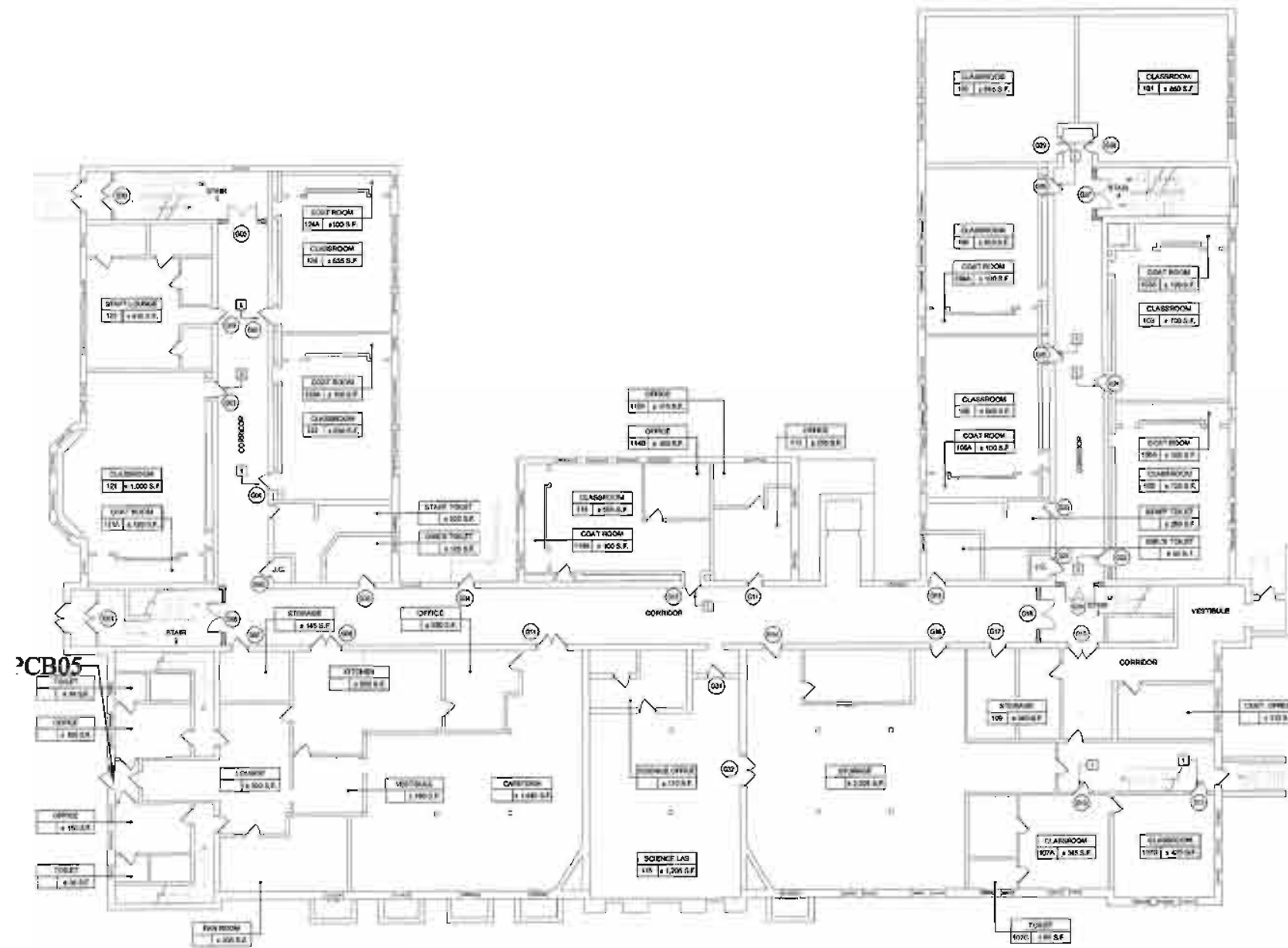


REVISIONS:		
NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
PCB SAMPLE LOCATIONS PLAN
BASEMENT

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 09/09/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER:
	PCB001
	DRAWING NUMBER:
	1 OF 4



1 GROUND FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com

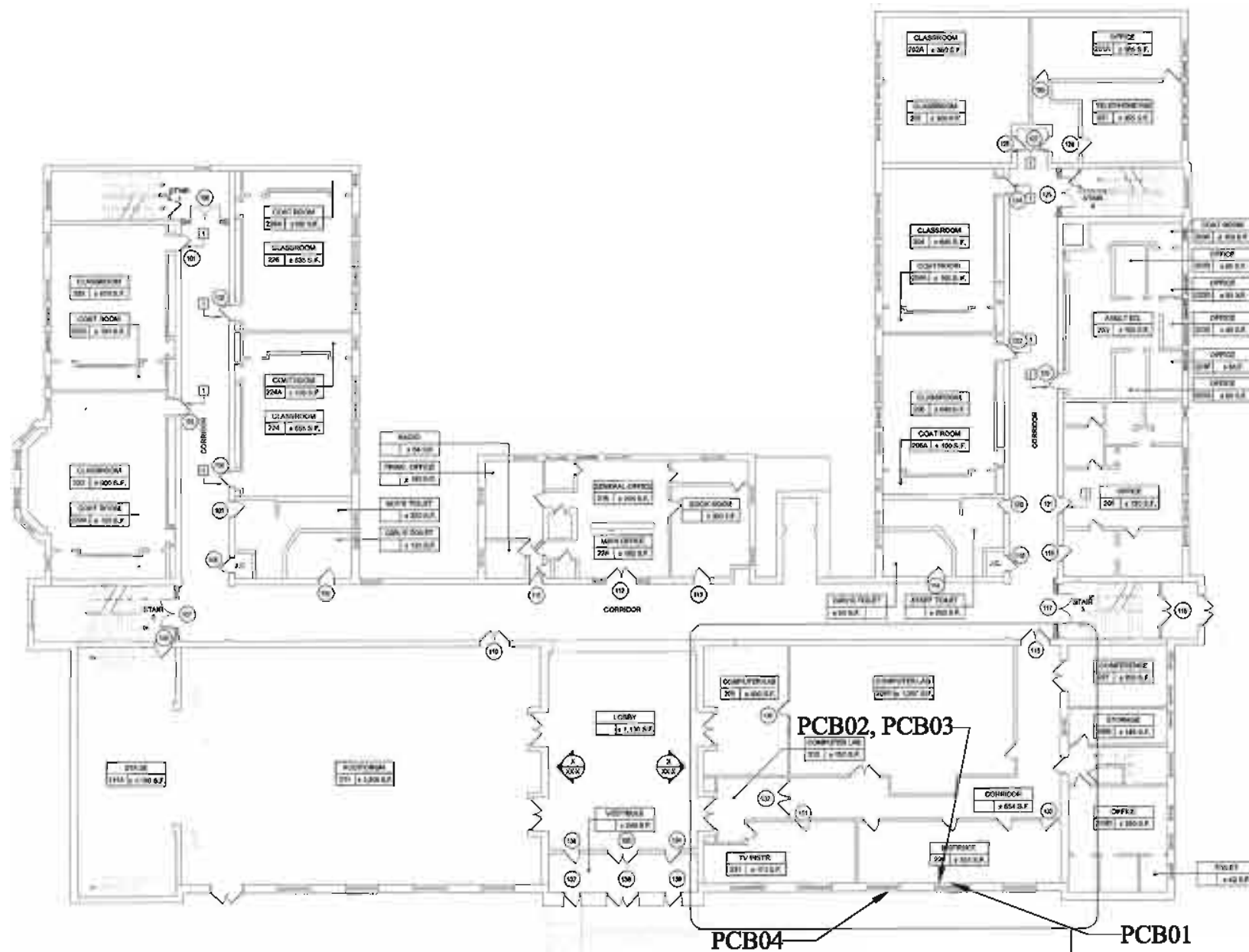


REVISIONS:		
NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
PCB SAMPLE LOCATIONS PLAN
GROUND FLOOR

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 09/09/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER:
	PCB002
	DRAWING NUMBER:
	2 OF 4



1 FIRST FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com

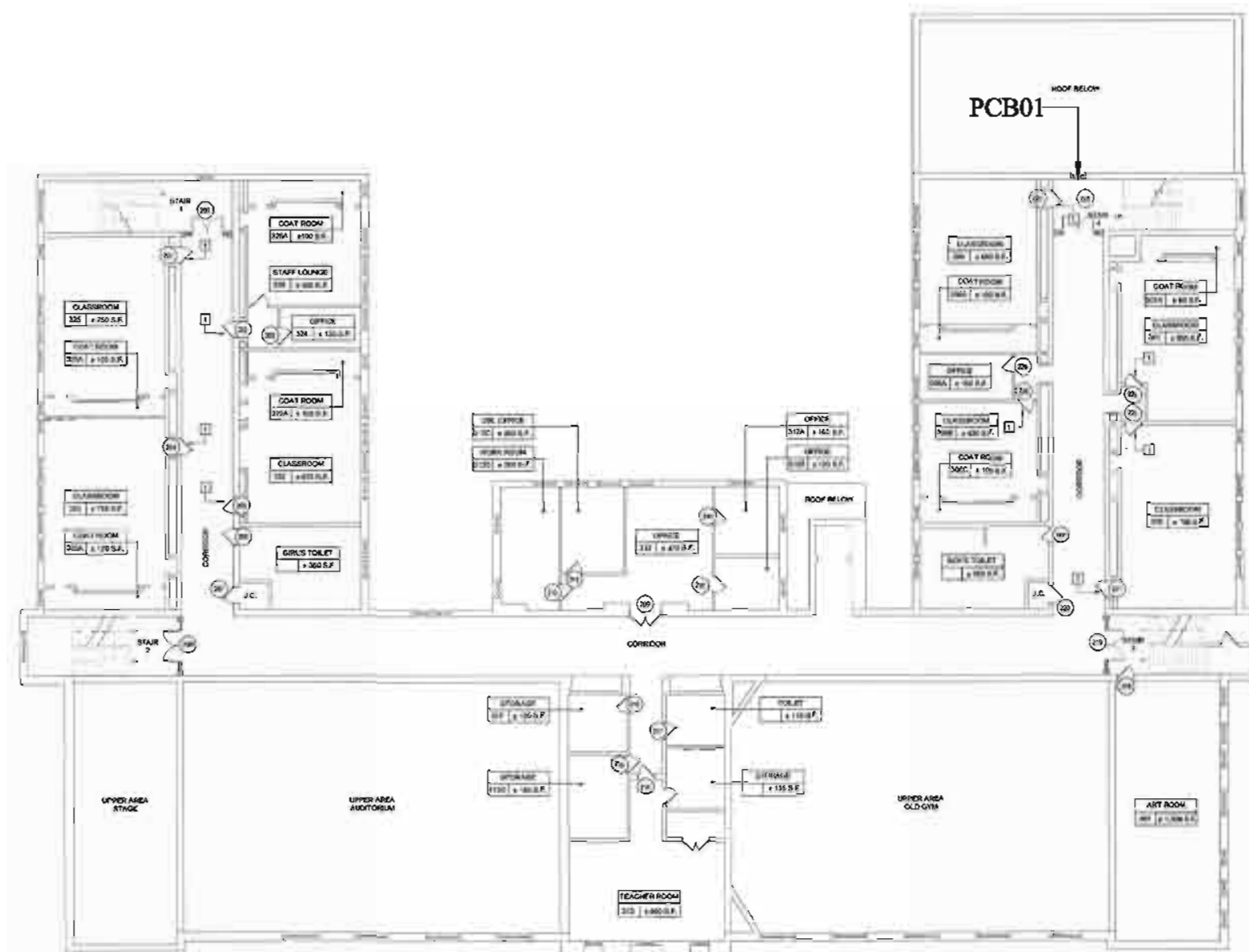


REVISIONS:		
NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
PCB SAMPLE LOCATIONS PLAN
FIRST FLOOR

DRAWN BY: J. PEREZ	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 09/09/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER:
	PCB003
	DRAWING NUMBER:
	3 OF 4



1 SECOND FLOOR PLAN
SCALE: NTS

KEY PLAN



Louis Berger Group, Inc.
585 Tuxedo Road
Elmsford, NY 10523
TEL 212.512.7800 FAX 212.363.4341 WWW.louisberger.com



REVISIONS:		
NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:
PCB SAMPLE LOCATIONS PLAN
SECOND FLOOR

DRAWN BY: J. PERKINS	SCALE: NOT TO SCALE
INSPECTED BY: A. CHESKIN	DATE: 09/09/2013
CHECKED BY: C. NAPOLITANO	DRAWING NUMBER:
	PCB004
	DRAWING NUMBER:
	4 OF 4



Final Report for Environmental Inspection Services

APPENDIX I: COMPANY LICENSE, PERSONNEL CERTIFICATIONS AND LABORATORY ACCREDITATIONS

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

The Louis Berger Group, Inc.
16th Floor
48 Wall Street

New York, NY 10005

FILE NUMBER: 03-0940
LICENSE NUMBER: 29635
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 12/20/2012
EXPIRATION DATE: 12/31/2013

Duly Authorized Representative – Craig Napolitano:

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, Acting Director
For the Commissioner of Labor

STATE OF NEW YORK - DEPARTMENT OF LABOR

ASBESTOS CERTIFICATE



ANDREW B. CHESKIN
CLASS(EXPIRES)
C ATEC(09/13) D JNSP(09/13)
E MGPL(09/13) H PM (09/13)
I PD (09/13)

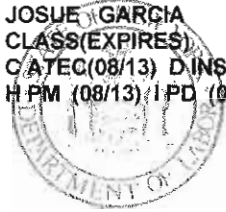
CERT# 05-04280
DMV# 304231776

MUST BE CARRIED ON ASBESTOS PROJECTS

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

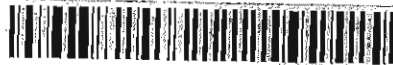


JOSUE GARCIA
CLASS(EXPIRES)
C/ATEC(08/13) D/INSP(08/13)
H/PM (08/13) I/PD (08/13)



CERT# 01-04292

MUST BE CARRIED ON ASBESTOS PROJECTS



EYES BLK
HAIR BLK
HGT 5' 06"

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

United States Environmental Protection Agency

This is to certify that

The Louis Berger Group, 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:

New York

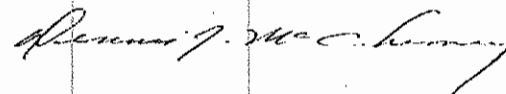
This certification is valid from the date of issuance and expires November 27, 2013

NY-2612-4

Certification #

MAR 10 2011

Issued On



Dennis J. McChesney, Ph.D., MBA, Acting Chief

Pesticides & Toxic Substances Branch



**New York
INSPECTOR**



**Certified Lead-Based
Paint Professional**

Certification No NY-11881-2	
Date of Birth 08/20/1972	Expiration Date 06/26/2016
Address 142 Garth Rd., Apt. 6B Scarsdale, NY 10583	
Badge Holder's Name Andrew Brian Cheskin	
Badge Holder's Signature 	



If found, drop in any mailbox.
Postmaster: Please return to:
US EPA
1200 Pennsylvania Ave, NW
(MC-74040T)
Washington, DC 20460
or call 1-800-424-LEAD

New York
RISK ASSESSOR



**Certified Lead-Based
Paint Professional**

Certification No NY-R-6928-3	
Date of Birth	Expiration Date 04/09/2014
Address	
Badge Holder's Name Josue Garcia	
Badge Holder's Signature 	



If found, drop in any mailbox
Postmaster: Please return to:
US EPA
1200 Pennsylvania Ave, NW
(MC-74040T)
Washington, DC 20460
or call 1-800-424-LEAD

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2014
Issued April 01, 2013

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. JAMES HALL
EMSL ANALYTICAL, INC
307 WEST 38TH STREET
NEW YORK, NY 10018

NY Lab Id No: 11506

*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:*

Metals I

Lead, Total EPA 7000B

Miscellaneous

Asbestos in Friable Material EPA 600/M4/82/020
Item 198.1 of Manual

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

Lead in Dust Wipes EPA 7000B

Lead in Paint EPA 7000B

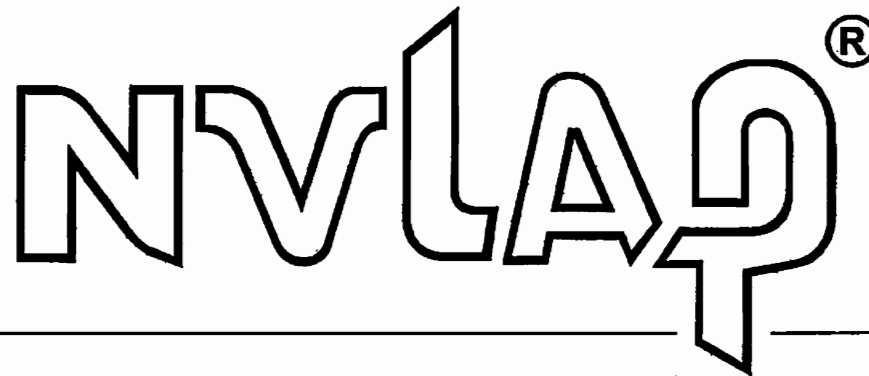
Sample Preparation Methods

APP. 14.2, HUD JUNE 1995
EPA 3050B

Serial No.: 48689

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.

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101048-9

EMSL Analytical, Inc.
New York, NY

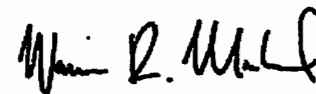
*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

BULK ASBESTOS FIBER ANALYSIS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2013-07-01 through 2014-06-30

Effective dates

A handwritten signature in black ink, appearing to read "William R. Muld".

For the National Institute of Standards and Technology



**National Voluntary
Laboratory Accreditation Program**



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

EMSL Analytical, Inc.

307 W. 38th Street

New York, NY 10018

Jim Hall

Phone: 212-290-0051 Fax: 212-290-0058

E-Mail: ssiegel@emsl.com

URL: <http://www.emsl.com>

BULK ASBESTOS FIBER ANALYSIS (PLM)

NVLAP LAB CODE 101048-9

<i>NVLAP Code</i>	<i>Designation / Description</i>
18/A01	EPA 600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

2013-07-01 through 2014-06-30

Effective dates

For the National Institute of Standards and Technology

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2014
Issued April 01, 2013

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 NON POTABLE WATER
All approved analytes are listed below:*

Phthalate Esters

Polychlorinated Biphenyls

Benzyl butyl phthalate	EPA 625
	EPA 8270C
	EPA 8270D
Bis(2-ethylhexyl) phthalate	EPA 625
	EPA 8270C
	EPA 8270D
Diethyl phthalate	EPA 625
	EPA 8270C
	EPA 8270D
Dimethyl phthalate	EPA 625
	EPA 8270C
	EPA 8270D
Di-n-butyl phthalate	EPA 625
	EPA 8270C
	EPA 8270D
Di-n-octyl phthalate	EPA 625
	EPA 8270C
	EPA 8270D

PCB-1242	EPA 608
	EPA 8082
PCB-1248	EPA 608
	EPA 8082
PCB-1254	EPA 608
	EPA 8082
PCB-1260	EPA 608
	EPA 8082

Polynuclear Aromatics

Acenaphthene	EPA 625
	EPA 8270C
	EPA 8270D
Acenaphthylene	EPA 625
	EPA 8270C
	EPA 8270D
Anthracene	EPA 625
	EPA 8270C
	EPA 8270D
Benzo(a)anthracene	EPA 625
	EPA 8270C
	EPA 8270D
Benzo(a)pyrene	EPA 625
	EPA 8270C
	EPA 8270D
Benzo(b)fluoranthene	EPA 625

Polychlorinated Biphenyls

PCB-1016	EPA 608
	EPA 8082
PCB-1221	EPA 608
	EPA 8082
PCB-1232	EPA 608
	EPA 8082

Serial No.: 48421

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.





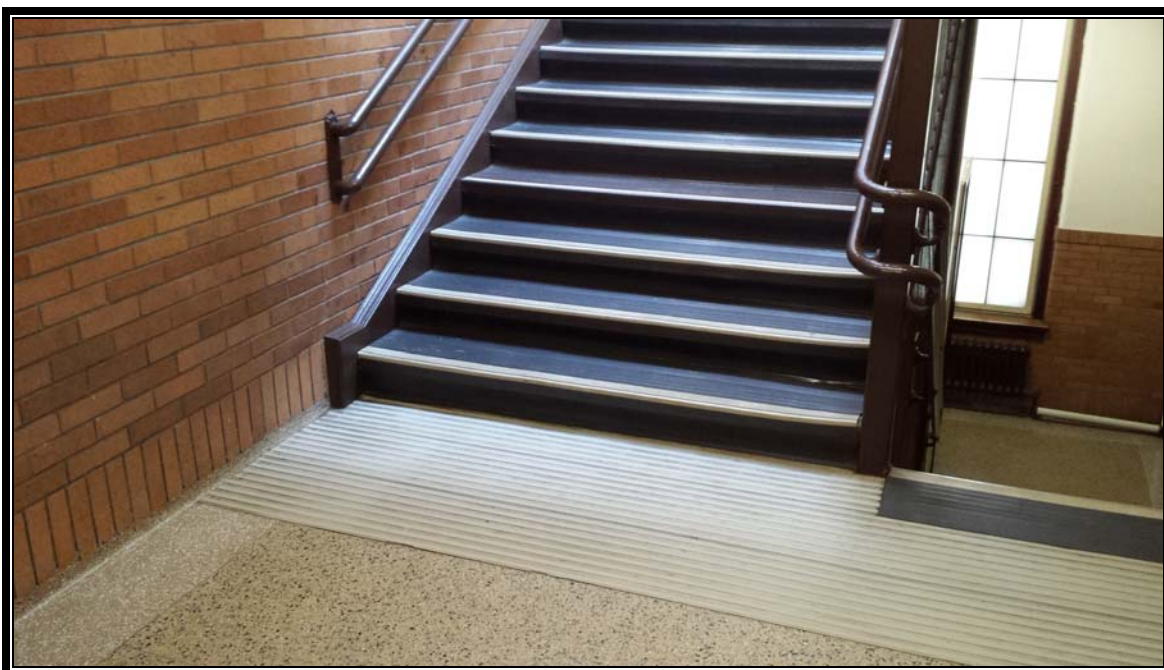
Final Report for Environmental Inspection Services

APPENDIX J: PHOTOGRAPHIC DOCUMENTATION

**ASBESTOS & LEAD BASED PAINTS INSPECTION SERVICES FOR
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606
PHOTODOCUMENTATION LOG**



Photograph 1: Ceiling Deck in Gymnasium



Photograph 2: Terrazzo Flooring & Interior Brick Mortar

**ASBESTOS & LEAD BASED PAINTS INSPECTION SERVICES FOR
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606
PHOTODOCUMENTATION LOG**



Photograph 3: 1'x1' Ceiling Tile, Textured, 1'x1' Ceiling Tile, Textured, Mastic & Ceiling Plaster, White & Brown Coats



Photograph 4: Exterior Window Frame Caulk, Grey

**ASBESTOS & LEAD BASED PAINTS INSPECTION SERVICES FOR
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606
PHOTODOCUMENTATION LOG**



Photograph 5: 2'x4' Ceiling Tile, Patterned/Pinhole



Photograph 6: 1'x1' Ceiling Tile, Pinhole

**ASBESTOS & LEAD BASED PAINTS INSPECTION SERVICES FOR
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606
PHOTODOCUMENTATION LOG**



Photograph 7: Interior Window Frame Caulk, Grey



Photograph 8: Interior Window Frame Caulk, Beige (To A/C Units)

**ASBESTOS & LEAD BASED PAINTS INSPECTION SERVICES FOR
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606
PHOTODOCUMENTATION LOG**



Photograph 9: 1'x1' Ceiling Tile, Spline

LIMITED INSPECTION FOR ASBESTOS-CONTAINING MATERIALS

**Rochambeau Alternative High School
228 Fisher Avenue
White Plains, NY 10606**



Prepared For:



**White Plains Public Schools
5 Homeside Lane
White Plains, NY 10605**

Prepared By:



LOUIS BERGER & ASSOC., P.C.

**565 Taxter Road, Suite 510
Elmsford, New York 10523**

Tel. (914) 798-3710

Fax (914) 592-1734

PROJECT NO. 3000865.00

Submission: November 15, 2013



Louis Berger & Assoc., P.C.

565 Taxter Road, Suite 510, Elmsford, NY 10523

Tel 914 798-3710

Fax 914 592-1734

www.louisberger.com

November 15, 2013

Mr. Frank Stefanelli
Director of Facilities
White Plains City School District
508 North Street
White Plains, NY 10605

**Subject: Report of Limited Asbestos Inspection Services
Ceiling Tile Survey
Rochambeau Alternative High School
228 Fisher Avenue
White Plains, NY 10606**

Dear Mr. Stefanelli:

Louis Berger & Assoc., P.C. (LBA) has completed a limited asbestos materials survey at the Rochambeau Alternative High School located at 228 Fisher Avenue, White Plains, New York. The survey included visual observation, material sampling, and laboratory sample analysis of suspect Asbestos-Containing Materials (ACM).

The attached report presents descriptions and results of the material sampling procedures and analysis. Relevant general project information is provided, followed by our findings, assessments and recommendations. Laboratory analysis data and certifications are provided in the Appendices.

If you have any questions concerning this report or if we may be of further assistance to you, please contact us.

Sincerely,

LOUIS BERGER & ASSOC., P.C. (LBA)

Craig Napolitano, CHMM
Associate Vice President, Industrial Hygiene & Hazmat Services



Limited Asbestos Inspection Report

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION.....	1
2.0 FIELD SURVEY PROCEDURES AND SAMPLE ANALYSIS METHODS	1
3.0 SUMMARY OF INSPECTION RESULTS.....	3
4.0 CONCLUSIONS AND RECOMMENDATIONS.....	3
5.0 ASBESTOS ABATEMENT COST ESTIMATES.....	4
6.0 AREAS NOT ACCESSIBLE	5
7.0 LIMITATIONS, EXCEPTIONS, ASSUMPTIONS & CERTIFICATIONS.....	5

APPENDICES

Appendix A: Summary of Asbestos Bulk Sample Locations, Laboratory Analysis Results and Chain of Custody

Appendix B: Laboratory Accreditations and Personnel/Company Certifications

Appendix C: Bulk Sample Locations Drawings

Appendix D: Asbestos Containing Material Locations Drawings

Appendix E: Photo Log

Appendix F: Previous Asbestos Report



Limited Asbestos Inspection Report

1.0 INTRODUCTION

At the request of the White Plains Public Schools, Louis Berger & Assoc., P.C. (LBA) has conducted a limited asbestos materials survey for the presence of asbestos-containing materials (ACM) for the Ceiling Tile Bulk Sampling at Rochambeau Alternative High School located at 228 Fisher Avenue, White Plains, New York. The asbestos inspection was conducted on October 8, 2013 by Mr. Josue Garcia. Mr. Garcia (Cert# 01-04292) is a New York State Department of Labor (NYSDOL) Asbestos Inspector. The limited inspection involved a visual examination and sampling of all suspect ceiling tiles throughout the school. Inspection results are presented in Appendix A.

2.0 FIELD SURVEY PROCEDURES AND SAMPLE ANALYSIS METHODS

Guidelines used for the inspection were established by the Environmental Protection Agency (EPA) in the Guidance for Controlling Asbestos Containing Materials in Buildings, Office of Pesticides and Toxic Substances, Doc 560/5-85-024, and 40 CFR Part 763, Asbestos Hazard Emergency Response Act (AHERA)

Field information was organized in accordance with the AHERA methodology of homogenous area (HA). During the survey, reasonable effort was made to identify all locations and types of ACM materials associated with the scope of work. Sampling has included multiple samples of the same materials chosen at random. However, due to inconsistencies of a manufacturer's processes and the contractor's installation methods, materials of similar construction may contain various amounts of asbestos. Furthermore, some materials that were not originally specified to contain asbestos may in fact contain this mineral. For example, cementitious pipe insulation and plaster were frequently mixed with asbestos at the construction site for ease of application. Locating all asbestos materials can only be definitively achieved by conducting exploratory demolition and sampling every section of pipe insulation, fitting or valve covering, fireproofing, and other suspect ACM.

Bulk samples of suspect ACM are analyzed using polarized light microscopy (PLM) coupled with dispersion staining, as described in 40 CFR Part 763 and the National Emissions Standard for Hazardous Air Pollutants (NESHAPS). NESHAPS is the standard industry protocol for the determination of asbestos in building materials. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The color displays that result are compared to a standardized atlas whereby the specific variety of asbestos is determined. It should also be recognized that PLM is primarily a qualitative identification method whereby asbestos percentage, if any, is estimated. While EPA, New York State, and New York City regulations governing ACM consider materials containing greater than 1-percent as asbestos, accurately quantifying asbestos content below 5-percent has been shown to be unreliable.

The New York State Department of Health has recently revised the PLM Stratified Point Counting Method. The March 25th, 2011 method, "Polarized Light Microscopy Methods for Identifying and Quantifying Asbestos in Bulk Samples" can be found as Item 198.1 in the Environmental Laboratory Approval program (ELAP) Certification manual. Whereas the



Limited Asbestos Inspection Report

procedure of analysis for bulk samples that fall into the category of "Non-friable Organically Bound" (NOB) can be found in the March 25th 2011 method "Polarized-Light Microscope Method for Identifying and Quantifying Asbestos in Non-Friable Organically Bound Bulk Samples", Item 198.6 in the ELAP Certification Manual. This category includes any sample in a flexible to rigid asphalt or vinyl matrix (floor tiles, mastic, roofing shingles, roofing felt, etc.). These samples must be "ashed" in a muffle furnace at 480-degrees Celsius (to remove organic matrix), treated with acid (to remove any mineral carbonate), and filtered through a 0.4-micron polycarbonate filter before being analyzed by PLM. The sample must be weighted between each of these steps to track the percent loss of organic matrix.

ELAP has determined that analysis of NOB materials is not reliably performed by PLM. Therefore, if PLM analysis yields results of 1-percent asbestos or less, the result must be confirmed by TEM. For bulk samples that undergo TEM analysis, the March 25th, 2011 method "Transmission Electron Microscope Method for Identifying and Quantitating Asbestos in Non-Friable organically Bound Bulk Samples" must be used and can be found as Item 198.4 in the ELAP Certification Manual. ELAP certified laboratories must include the following statement with their PLM analysis results for each "negative" (1-percent or less asbestos) NOB sample: "Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Before this material can be considered or treated as non-ACM, confirmation must be made by quantitative transmission electron microscopy".

All samples are initially analyzed by Polarized Light Microscopy in accordance with Item 198.1 and 198.6 of the ELAP Certification Manual. Samples which yield a negative PLM result and which are classified as a "non-friable" material, are then re-analyzed utilizing TEM methodology in accordance with Item 198.4 of the ELAP Certification Manual. The laboratory performing both these analysis procedures is EMSL located at 307 West 38th Street, New York, NY 10018. The laboratory has received accreditation from the following agencies:

- National Voluntary Laboratory Accreditation Program (Lab Code 101048-9)
- New York State Environmental Laboratory Approval Program (Lab No. 11506)
- American Industrial Hygiene Association Accredited Laboratory (Lab No. 102581)



Limited Asbestos Inspection Report

3.0 SUMMARY OF INSPECTION RESULTS

The limited asbestos inspection was conducted on October 8, 2013 and involved a visual examination of Basement, Ground Floor, First Floor and Second Floor. Sampling of all suspect ceiling tiles was also performed. Inspection results are presented in Appendix A.

Asbestos in amounts **greater than 1%** was found in the following material:

Throughout Building:

- **None**

Laboratory analysis and/or visual inspection confirmed **no asbestos** present in amounts greater than 1% in samples collected from the following materials:

Throughout Building:

- 2'x4' Large Gouged Ceiling Tile, White
- 2'x4' Fissured Ceiling Tile, White
- 1'x1' Gouged Ceiling Tile, Gray
- 2'x4' Gouged Ceiling Tile, White
- 2'x4' Stripe Design Ceiling Tile, White
- 2'x4' Fissured/Pinhole Ceiling Tile, White
- 1'x1' Ceiling Tile, Textured (LBA report dated 9/9/13)
- 2'x4' Ceiling Tile, Patterned/Pinhole (old gymnasium) (LBA report dated 9/9/13)
- 1'x1' Ceiling Tile, Pinhole (old gymnasium) (LBA report dated 9/9/13)
- 1'x1' Ceiling Tile, Pinhole (Cafeteria) (LBA report dated 9/9/13)
- 1'x1' Ceiling Tile, Spline (LBA report dated 9/9/13)

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on analytical results and our observations, the following materials were determined to be ACM:

- **None**

In the event that identified ACMs are to be disturbed by renovation work, proper asbestos abatement procedures are required to be implemented prior to the commencement of such work. All asbestos abatement work must be performed in accordance with all applicable Federal, State and Local rules and regulations. A licensed abatement contractor must perform the removal of all friable and non-friable ACM.



Limited Asbestos Inspection Report

5.0 ASBESTOS ABATEMENT COST ESTIMATES

The unit costs listed in this section are based on other projects of similar size, location and complexity. The cost estimate is budgetary in nature, since there are many variables that will affect the final construction cost. The costs presented are based on extrapolations from current construction prices available to us for comparable work in this area. "Means" guides were consulted, when applicable, with regional price adjustments for this area. However, Berger relies primarily on costs obtained from similar work recently bid.

Prices are based on current costs associated with prevailing wages and a competitive bid situation. Quantities are derived from our observation and linear takes-offs where drawings were made available to us or schematic drawing could easily be created from available information. Actual construction costs may vary based on a fully developed scope of work delineated in construction plans and specifications.

There will be other factors affecting the costs at the time projects are actually scheduled and bid. Such factors include the overall size of the total work package bid by a contractor, unforeseen conditions, state of the economy, inflation and the availability of materials. If the project is phased, escalation in cost should be anticipated.

Cost estimates have been prepared with the following assumptions:

- Union labor or prevailing wage
- Insurance, profit and overhead costs have been estimated and will vary among contractors
- All work areas may not be able to be abated in a continuous fashion and down time may occur for varying periods.
- Electric power and water to be provided by others
- Prices do not include air monitoring costs
- Reinstallation work has not been factored into the cost estimates

Asbestos Material	Quantity	Unit Price	Cost Estimate
	0 SF	\$10	\$0
<i>ACM Removal Sub-Total</i>			\$0
<i>Decontaminations Units</i>			\$0
<i>Mobilization & Demobilization</i>			\$0
<i>Sub-Totals</i>			\$0
<i>Insurance @ 7%</i>			\$0
<i>Profit/Overhead @ 15%</i>			\$0

Notes:

1. The above cost includes the waste hauling charges, filing fees and other miscellaneous cost associated with asbestos abatement by the abatement contractor.



Limited Asbestos Inspection Report

6.0 AREAS NOT ACCESSIBLE

Louis Berger & Assoc., P.C. inspected and sampled materials, which were observable and accessible to the survey team. It is possible, however, that additional suspect ACM may exist within interstitial space (i.e. above fixed ceilings, etc.), which were not accessible without using destructive means. Any materials that have not been tested and/or found asbestos positive must be assumed ACM.

7.0 LIMITATIONS, EXCEPTIONS, ASSUMPTIONS & CERTIFICATIONS

Opinions and recommendations presented in this report apply to site conditions and features as they existed at the time of Berger's site visit, and those reasonably foreseeable. They cannot necessarily apply to conditions and features of which Berger is unaware and has not had the opportunity to evaluate.

The conclusions presented in this report are professional opinions solely upon Berger's visual observations of accessible areas, laboratory test data, and current regulatory requirements. These conclusions are intended exclusively for the purpose stated herein, at the site indicated, for the ceiling tile bulk sampling reassessment project.

It is important to recognize that even the most comprehensive scope of services may fail to detect all asbestos containing materials that may be associated with the property. Therefore, Berger cannot act as insurers and cannot "certify" that all ACM associated with the property have been identified, and no expressed or implied representation or warranty is included or intended in our reports, except that our services were performed, within the limits prescribed by our client, with the customary thoroughness and competence of our profession.

Prepared by:



Josue Garcia
Senior Environmental Specialist

Reviewed by:



Craig Napolitano, CHMM
Associate Vice President, Industrial Hygiene
& Hazmat Services



Limited Asbestos Inspection Report

APPENDIX A: SUMMARY OF ASBESTOS BULK SAMPLE LOCATIONS, LABORATORY ANALYTICAL RESULTS AND CHAIN OF CUSTODY



Limited Asbestos Inspection Report

APPENDIX A SAMPLE ANALYSIS RESULTS IN TABULAR FORM

ROCHAMBEAU ALTERNATIVE HIGH SCHOOL 228 FISHER AVENUE WHITE PLAINS, NY 10606

Homogeneous Area No.	Sample No.	Location	Material	ACM Quantity	Condition	Friability	PLM Result	TEM Result
01	01	First Floor, Northeast Storage	2'x4' Large Gouged Ceiling Tile, White	--	--	Friable	NAD	NAD
01	02	First Floor, Northeast Storage	2'x4' Large Gouged Ceiling Tile, White	--	--	Friable	NAD	NAD
02	03	First Floor, Northeast Office	2'x4' Fissured Ceiling Tile, White	--	--	Friable	NAD	NAD
02	04	First Floor, Classroom 225	2'x4' Fissured Ceiling Tile, White	--	--	Friable	NAD	NAD
03	05	First Floor, Room 203	1'x1' Gouged Ceiling Tile, Gray	--	--	Friable	NAD	NAD
03	06	First Floor, Room 203	1'x1' Gouged Ceiling Tile, Gray	--	--	Friable	NAD	NAD
04	07	First Floor, Main Office	2'x4' Gouged Ceiling Tile, White	--	--	Friable	NAD	NAD
04	08	First Floor, Main Office	2'x4' Gouged Ceiling Tile, White	--	--	Friable	NAD	NAD
05	09	First Floor, Classroom 224	2'x4' Stripe Design Ceiling Tile, White	--	--	Friable	NAD	NAD
05	10	First Floor, Classroom 224	2'x4' Stripe Design Ceiling Tile, White	--	--	Friable	NAD	NAD



Limited Asbestos Inspection Report

Homogeneous Area No.	Sample No.	Location	Material	ACM Quantity	Condition	Friability	PLM Result	TEM Result
06	11	First Floor, Classroom 225	2'x4' Fissured/Pinhole Ceiling Tile, White	--	--	Friable	NAD	NAD
06	12	First Floor, Classroom 225	2'x4' Fissured/Pinhole Ceiling Tile, White	--	--	Friable	NAD	NAD

NAD = No Asbestos Detected

N/A = Not Applicable

Bold = Positive for ACM

NA/PS = Not analyzed/ positive sample

**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: 031340230

CustomerID: LOUI56

CustomerPO: 3000865

ProjectID:

Attn: **Craig Napolitano**
The Louis Berger Group, Inc.
48 Wall St.
16th Floor
New York, NY 10005

Phone: (212) 612-7900
 Fax:
 Received: 10/14/13 12:13 PM
 Analysis Date: 10/16/2013
 Collected: 10/8/2013

Project: 3000865/ WHITE PLAINS PUBLIC SCHOOL/ ROCHAMBEAU ELEMENTARY SCHOOL/ THROUGHOUT BUILDING

Test Report:Asbestos Analysis of Bulk Material

Test		Analyzed Date	Color	Non Asbestos		Asbestos
				Fibrous	Non-Fibrous	
Sample ID	01 031340230-0001		Description Homogeneity	2' X 4' LARGE GAUGED CEILING TILE/ WHITE - FIRST FLOOR/ NORTH EAST STORAGE Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray	Inconclusive: None Detected			
TEM NYS 198.4 NOB	10/16/2013	Gray	None Detected			
Sample ID	02 031340230-0002		Description Homogeneity	2' X 4' LARGE GAUGED CEILING TILE/ WHITE - FIRST FLOOR/ NORTH EAST STORAGE Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray	Inconclusive: None Detected			
TEM NYS 198.4 NOB	10/16/2013	Gray	None Detected			
Sample ID	03 031340230-0003		Description Homogeneity	2' X 4' FISSURED CEILING TILE/ WHITE - FIRST FLOOR/ NORTH EAST OFFICE Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray	Inconclusive: None Detected			
TEM NYS 198.4 NOB	10/16/2013	Gray	None Detected			
Sample ID	04 031340230-0004		Description Homogeneity	2' X 4' FISSURED CEILING TILE/ WHITE - FIRST FLOOR/ CLASSROOM 225 Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray	Inconclusive: None Detected			
TEM NYS 198.4 NOB	10/16/2013	Gray	None Detected			
Sample ID	05 031340230-0005		Description Homogeneity	1' X 1' GAUGED CEILING TILE/ GRAY - FIRST FLOOR/ ROOM 203 Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray	Inconclusive: None Detected			
TEM NYS 198.4 NOB	10/16/2013	Gray	None Detected			

**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: 031340230

CustomerID: LOUI56

CustomerPO: 3000865

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos		
Test		Color	Fibrous	Non-Fibrous
Sample ID	06	Description	1' X 1' GAUGED CEILING TILE/ GRAY - FIRST FLOOR/ ROOM 203	Asbestos
	031340230-0006	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	10/16/2013	Gray		None Detected
Sample ID	07	Description	2' X 4' GAUGED CEILING TILE/ WHITE - FIRST FLOOR/ MAIN OFFICE	
	031340230-0007	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	10/16/2013	Gray		None Detected
Sample ID	08	Description	2' X 4' GAUGED CEILING TILE/ WHITE - FIRST FLOOR/ MAIN OFFICE	
	031340230-0008	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	10/16/2013	Gray		None Detected
Sample ID	09	Description	2' X 4' STRIPE DESIGN CEILING TILE/ WHITE - FIRST FLOOR/ CLASSROOM 224	
	031340230-0009	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	10/16/2013	Gray		None Detected
Sample ID	10	Description	2' X 4' STRIPE DESIGN CEILING TILE/ WHITE - FIRST FLOOR/ CLASSROOM 224	
	031340230-0010	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	10/16/2013	Gray		None Detected
Sample ID	11	Description	2'X 4' FISSURED/ PINHOLE CEILING TILE/ WHITE - FIRST FLOOR/ CLASSROOM 225	
	031340230-0011	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	10/16/2013	Gray		None Detected

**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: 031340230

CustomerID: LOUI56

CustomerPO: 3000865

ProjectID:

Test Report: Asbestos Analysis of Bulk Material

Test		Non Asbestos			Asbestos
		Color	Fibrous	Non-Fibrous	
Sample ID	12	Description	2'X 4' FISSURED/ PINHOLE CEILING TILE/ WHITE - FIRST FLOOR/ CLASSROOM 225		
	031340230-0012	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	10/16/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	10/16/2013	Gray	None Detected		

Analyst(s)

Albert Grohmann

Evie Sioukri

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



THE LOUIS BERGER
GROUP, INC.

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 1 OF 1

PROJECT NO.: 3000 865

CLIENT: White Plains Public School

PROJECT SITE: Rochambeau Elementary School

Project Manager: Craig Napolitano

LOCATION(S) SURVEYED: Throughout Building

DATE(S) OF INSPECTION: 10/8/13

Inspector(s): Josue Garcia

03/340230

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com, jgarcia@louisber.com

TURNAROUND TIME: ☐ 4 HR. ☐ 12 HR
☐ 24 HR. ☐ 48 HR. ☒ 72 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
01	01	2'x4' Large Gouged Ceiling Tile, white	First Floor Northeast Storage		
	02	↓	↓ ↓		
02	03	2'x4' Fissured Ceiling Tile, white	First Floor Northeast Office		
	04	↓	↓ Classroom 225		
03	05	1'x1' Gouged Ceiling Tile, Gray	First Floor Room 203		
	06	↓	↓ ↓		
04	07	2'x4' Gouged Ceiling Tile, white	First Floor Main Office		
	08	↓	↓ ↓		
05	09	2'x4' Stripe Design Ceiling Tile, white	First Floor Classroom 224		
	10	↓	↓ ↓		
06	11	2'x4' Fissured/Pinkish Ceiling Tile, white	First Floor Classroom 225		
	12	↓	↓ ↓		

CHAIN OF CUSTODY

Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
S. Garcia		10/14/13									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
LaBella Andrews		10/14/13	12:13pm								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.



Limited Asbestos Inspection Report

APPENDIX B: LABORATORY ACCREDITATIONS AND PERSONNEL/COMPANY CERTIFICATIONS

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER



Expires 12:01 AM April 01, 2014
Issued April 01, 2013

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MR. JAMES HALL
EMSL ANALYTICAL, INC
307 WEST 38TH STREET
NEW YORK, NY 10018

NY Lab Id No: 11506

*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:*

Metals I

Lead, Total EPA 7000B

Miscellaneous

Asbestos in Friable Material EPA 600/M4/82/020
Item 198.1 of Manual

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

Lead in Dust Wipes EPA 7000B

Lead in Paint EPA 7000B

Sample Preparation Methods

APP. 14.2, HUD JUNE 1995

EPA 3050B

Serial No.: 48689

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.

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101048-9

EMSL Analytical, Inc.
New York, NY

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

BULK ASBESTOS FIBER ANALYSIS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2013-07-01 through 2014-06-30

Effective dates



A handwritten signature in black ink, appearing to read "Michael R. Mello".

For the National Institute of Standards and Technology



**National Voluntary
Laboratory Accreditation Program**



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

EMSL Analytical, Inc.

307 W. 38th Street

New York, NY 10018

Jim Hall

Phone: 212-290-0051 Fax: 212-290-0058

E-Mail: ssiegel@emsl.com

URL: <http://www.emsl.com>

BULK ASBESTOS FIBER ANALYSIS (PLM)

NVLAP LAB CODE 101048-9

NVLAP Code Designation / Description

18/A01 EPA 600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples

18/A03 EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

2013-07-01 through 2014-06-30

Effective dates

For the National Institute of Standards and Technology



AIHA Laboratory Accreditation Programs, LLC

acknowledges that

EMSL Analytical, Inc.

307 West 38th Street, New York, NY 10018

Laboratory ID: 102581

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

- ✓ **INDUSTRIAL HYGIENE**
- ✓ **ENVIRONMENTAL LEAD**
- ✓ **ENVIRONMENTAL MICROBIOLOGY**
- ☐ **FOOD**

Accreditation Expires: 08/01/2014

Accreditation Expires: 08/01/2014

Accreditation Expires: 08/01/2014

Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.


S. D. Allen Iske, PhD, CIH, CSP
Chairperson, Analytical Accreditation Board


Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 12: 03/29/2012

Date Issued: 11/30/2012

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE





JOSUE GARCIA
CLASS(EXPIRES)
C ATEC(08/14) D INSP(08/14)
H PM (08/14) I PD (08/14)

CERT# 01-04292
DMV# 816004194

MUST BE CARRIED ON ASBESTOS PROJECTS



EYES BLK
HAIR BLK
HGT 5' 06"



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



Limited Asbestos Inspection Report

APPENDIX C: BULK SAMPLE LOCATION DRAWINGS



ROCHAMBEAU ALTERNATIVE
SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

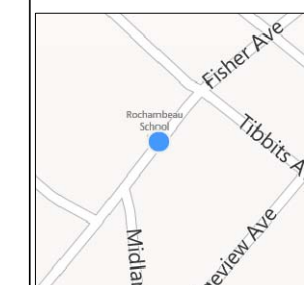
AHERA SITE PLAN



565 Taxter Road
Elmsford, NY 10523
TEL: 914.798.3710 FAX: 212.363.4341 WWW.LOUISBERGER.COM



KEY PLAN:



No.	Date	Issue
Sheet Title		

**BULK SAMPLE LOCATION PLAN
FIRST FLOOR**

	3000865.00
--	------------

Job No.
NOVEMBER 2013

Drawn by:
J. PEREZ

Checked by:
J. GARCIA

Checked by: J. GARCIA

BSL001



Limited Asbestos Inspection Report

**APPENDIX D:
ASBESTOS-CONTAINING MATERIAL
LOCATION DRAWINGS
(NOT APPLICABLE)**



Limited Asbestos Inspection Report

APPENDIX E: PHOTO LOG



Limited Asbestos Inspection Report



Photo # 01: 2'x4' Large Gouged Ceiling Tile, White

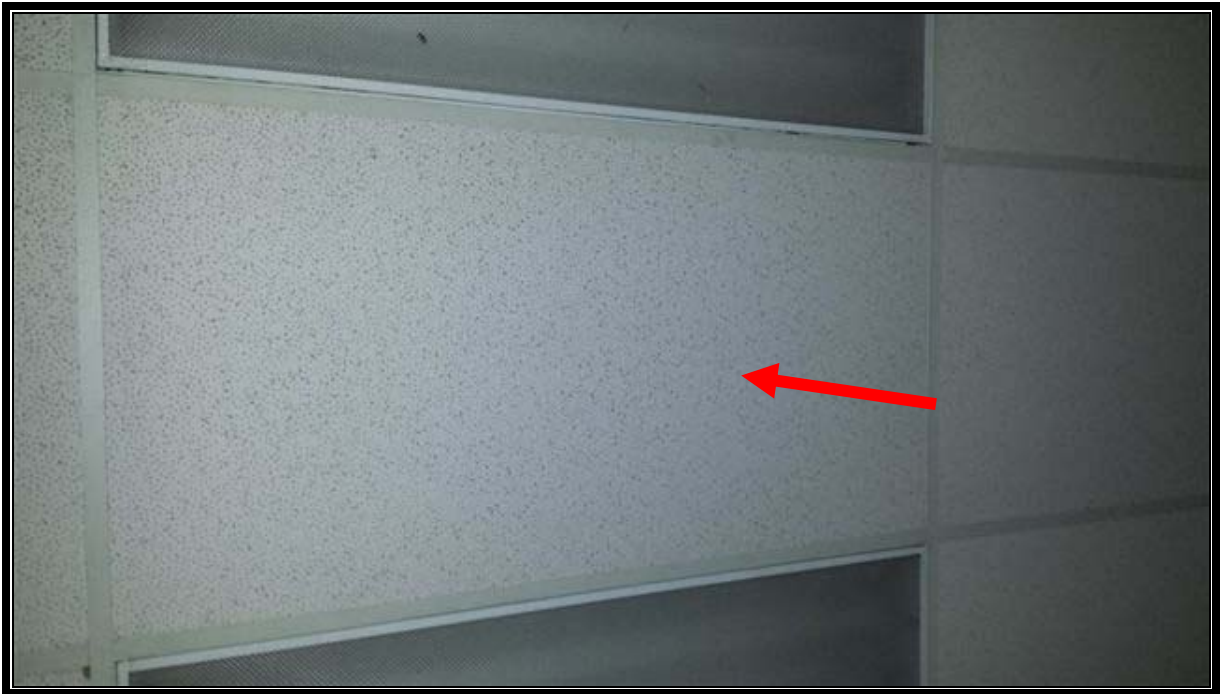


Photo # 02: 2'x4' Fissured Ceiling Tile, White



Limited Asbestos Inspection Report

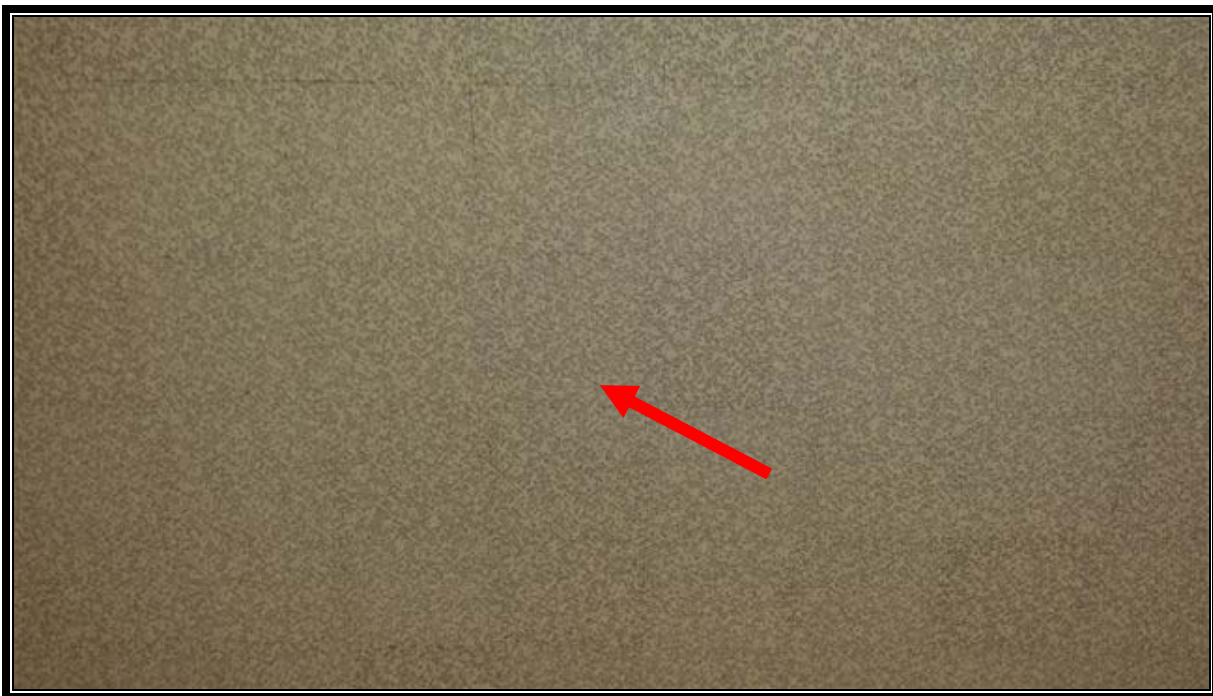


Photo # 03: 1'x1' Gouged Ceiling Tile, Gray



Photo # 04: 2'x4' Gouged Ceiling Tile, White



Limited Asbestos Inspection Report



Photo # 05: 2'x4' Fissured/Pinhole Ceiling Tile, White



Photo # 06: 2'x4' Stripe Design Ceiling Tile, White



Limited Asbestos Inspection Report



Photo # 07: 1'x1' Ceiling Tile, Textured



Photo # 08: 2'x4' Ceiling Tile, Patterned/Pinhole



Limited Asbestos Inspection Report



Photo # 09: 1'x1' Ceiling Tile, Pinhole



Photo # 10: 1'x1' Ceiling Tile, Spline



Limited Asbestos Inspection Report

APPENDIX F: PREVIOUS ABESTOS REPORT



Final Report For Environmental Inspection Services

APPENDIX A
SAMPLE ANALYSIS RESULTS IN TABULAR FORM
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
01	01A	Functional Space 2	Ceiling Plaster, White Coat	NAD	N/A
01	01B	Functional Space 3	Ceiling Plaster, White Coat	NAD	N/A
01	01C	Functional Space 5	Ceiling Plaster, White Coat	NAD	N/A
01	01D	Functional Space 8	Ceiling Plaster, White Coat	NAD	N/A
01	01E	Functional Space 9	Ceiling Plaster, White Coat	NAD	N/A
01	01F	Functional Space 15	Ceiling Plaster, White Coat	NAD	N/A
01	01G	Functional Space 17	Ceiling Plaster, White Coat	NAD	N/A
01	01H	Functional Space 19	Ceiling Plaster, White Coat	NAD	N/A
01	01I	Functional Space 20	Ceiling Plaster, White Coat	NAD	N/A
02	02A	Functional Space 2	Ceiling Plaster, Brown Coat	NAD	N/A
02	02B	Functional Space 3	Ceiling Plaster, Brown Coat	NAD	N/A
02	02C	Functional Space 5	Ceiling Plaster, Brown Coat	NAD	N/A
02	02D	Functional Space 8	Ceiling Plaster, Brown Coat	NAD	N/A
02	02E	Functional Space 9	Ceiling Plaster, Brown Coat	NAD	N/A
02	02F	Functional Space 15	Ceiling Plaster, Brown Coat	NAD	N/A
02	02G	Functional Space 17	Ceiling Plaster, Brown Coat	NAD	N/A
02	02H	Functional Space 19	Ceiling Plaster, Brown Coat	NAD	N/A

Bold = Positive for ACM
NAD = No Asbestos Detected

N/A = Not Applicable
NA/PS = Not analyzed/ positive sample



Final Report For Environmental Inspection Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
02	02I	Functional Space 20	Ceiling Plaster, Brown Coat	NAD	N/A
03	03A	Functional Space 2	Wall Plaster, White Coat	NAD	N/A
03	03B	Functional Space 3	Wall Plaster, White Coat	NAD	N/A
03	03C	Functional Space 5	Wall Plaster, White Coat	NAD	N/A
03	03D	Functional Space 8	Wall Plaster, White Coat	NAD	N/A
03	03E	Functional Space 9	Wall Plaster, White Coat	NAD	N/A
03	03F	Functional Space 15	Wall Plaster, White Coat	NAD	N/A
03	03G	Functional Space 17	Wall Plaster, White Coat	NAD	N/A
03	03H	Functional Space 19	Wall Plaster, White Coat	NAD	N/A
03	03I	Functional Space 20	Wall Plaster, White Coat	NAD	N/A
04	04A	Functional Space 2	Wall Plaster, Brown Coat	NAD	N/A
04	04B	Functional Space 3	Wall Plaster, Brown Coat	NAD	N/A
04	04C	Functional Space 5	Wall Plaster, Brown Coat	NAD	N/A
04	04D	Functional Space 8	Wall Plaster, Brown Coat	NAD	N/A
04	04E	Functional Space 9	Wall Plaster, Brown Coat	NAD	N/A
04	04F	Functional Space 15	Wall Plaster, Brown Coat	NAD	N/A
04	04G	Functional Space 17	Wall Plaster, Brown Coat	NAD	N/A
04	04H	Functional Space 19	Wall Plaster, Brown Coat	NAD	N/A
04	04I	Functional Space 20	Wall Plaster, Brown Coat	NAD	N/A
05	05A	Functional Space 1	Ceiling Deck	NAD	N/A

Bold = Positive for ACM
 NAD = No Asbestos Detected

N/A = Not Applicable
 NA/PS = Not analyzed/ positive sample



Final Report For Environmental Inspection Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
05	05B	Functional Space 1	Ceiling Deck	NAD	N/A
06	06A	Functional Space 3	1'x1' Ceiling Tile, Textured	NAD	NAD
06	06B	Functional Space 9	1'x1' Ceiling Tile, Textured	NAD	NAD
07	07A	Functional Space 3	1'x1' Ceiling Tile, Textured, Mastic	NAD	NAD
07	07B	Functional Space 9	1'x1' Ceiling Tile, Textured, Mastic	NAD	NAD
08	08A	Functional Space 3	Terrazzo Flooring	NAD	N/A
08	08B	Functional Space 8	Terrazzo Flooring	NAD	N/A
09	09A	Functional Space 3	Interior Brick Mortar	NAD	N/A
09	09B	Functional Space 9	Interior Brick Mortar	NAD	N/A
10	10A	West Exterior Façade	Exterior Window Frame Caulk, Grey	NAD	NAD
10	10B	East Exterior Façade	Exterior Window Frame Caulk, Grey	NAD	<1% Chrysotile
11	11A	West Exterior Façade	Exterior Brick Mortar	NAD	N/A
11	11B	South Exterior Façade	Exterior Brick Mortar	NAD	N/A
12	12A	Functional Space 11	2'x4' Ceiling Tile, Patterned/Pinhole	NAD	NAD
12	12B	Functional Space 11	2'x4' Ceiling Tile, Patterned/Pinhole	NAD	NAD
13	13A	Functional Space 11	1'x1' Ceiling Tile, Pinhole	NAD	NAD
13	13B	Functional Space 11	1'x1' Ceiling Tile, Pinhole	NAD	NAD
14	14A	Functional Space 11	1'x1' Ceiling Tile, Pinhole, Mastic	NAD	NAD
14	14B	Functional Space 11	1'x1' Ceiling Tile, Pinhole, Mastic	NAD	NAD

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NA/PS = Not analyzed/ positive sample



Final Report For Environmental Inspection Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
15	15A	Functional Space 11	Brick Mortar	NAD	N/A
15	15B	Functional Space 11	Brick Mortar	NAD	N/A
16	16A	Functional Space 11	Interior Window Frame Caulk, Grey	NAD	<1% Anthophyllite
16	16B	Functional Space 11	Interior Window Frame Caulk, Grey	NAD	<1% Anthophyllite
17	17A	Functional Space 11	Interior Window Frame Caulk, Beige	NAD	<1% Anthophyllite
17	17B	Functional Space 11	Interior Window Frame Caulk, Beige	NAD	<1% Anthophyllite
18	18A	East Façade	Exterior Stone Window Sill Caulk, Grey	NAD	NAD
18	18B	North Façade	Exterior Stone Window Sill Caulk, Grey	NAD	NAD
19	19A	East Façade	Exterior Brick Mortar (newer)	NAD	N/A
19	19B	East Façade	Exterior Brick Mortar (newer)	NAD	N/A
20	20A	Functional Space 12	Wall Plaster, White Coat	NAD	N/A
20	20B	Functional Space 12	Wall Plaster, White Coat	NAD	N/A
20	20B	Functional Space 12	Wall Plaster, White Coat	NAD	N/A
21	21A	Functional Space 12	Wall Plaster, Brown Coat	NAD	N/A
21	21B	Functional Space 12	Wall Plaster, Brown Coat	NAD	N/A
21	21B	Functional Space 12	Wall Plaster, Brown Coat	NAD	N/A
22	22A	Functional Space 18	Pipe Joint to Fiberglass Pipe Insulation	NAD	N/A
22	22B	Functional Space 18	Pipe Joint to Fiberglass Pipe Insulation	NAD	N/A

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Final Report For Environmental Inspection Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
22	22C	Functional Space 17	Pipe Joint to Fiberglass Pipe Insulation	NAD	N/A
23	23A	Functional Space 18	Interior Brick Mortar (Foundation Brick)	NAD	N/A
23	23B	Functional Space 19	Interior Brick Mortar (Foundation Brick)	NAD	N/A
24	24A	Functional Space 18	Pipe Gasket	NAD	NAD
24	24B	Functional Space 18	Pipe Gasket	NAD	NAD
25	25A	Functional Space 17	1'x1' Ceiling Tile, Pinhole	NAD	NAD
25	25B	Functional Space 17	1'x1' Ceiling Tile, Pinhole	NAD	NAD
26	26A	Functional Space 17	1'x1' Ceiling Tile, Pinhole, Mastic	NAD	NAD
26	26B	Functional Space 17	1'x1' Ceiling Tile, Pinhole, Mastic	NAD	NAD
27	27A	Functional Space 17	1"x1" Ceiling Tile, Spline	NAD	NAD
27	27B	Functional Space 17	1"x1" Ceiling Tile, Spline	NAD	NAD
28	28A	Functional Space 17	CMU Mortar	NAD	N/A
28	28B	Functional Space 17	CMU Mortar	NAD	N/A
29	29A	East Façade	Caulking to Exterior Stone Window Detailing	NAD	NAD
29	29B	East Façade	Caulking to Exterior Stone Window Detailing	NAD	NAD
30	30A	East Façade, Main Entrance	Putty to Main Entry Door Windows	NAD	<1% Anthophyllite
30	30B	East Façade, Main Entrance	Putty to Main Entry Door Windows	NAD	<1% Anthophyllite
31	31A	South Façade	Exterior Door Frame Caulk, Tan	NAD	NAD
31	31B	South Façade	Exterior Door Frame Caulk, Tan	NAD	NAD
32	32A	West Façade	Exterior Garage Door Frame Caulk, Beige	3.7% CHRYSOTILE	N/A

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Final Report For Environmental Inspection Services

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
32	32B	West Façade	Exterior Garage Door Frame Caulk, Beige	NA/PS	N/A
33	33A	West Façade	Exterior Garage Door Frame Caulk, Grey	NAD	NAD
33	33B	West Façade	Exterior Garage Door Frame Caulk, Grey	NAD	<1% Anthophyllite
34	34A	West Façade	Exterior Window Frame Caulk, Off White	NAD	NAD
34	34B	West Façade	Exterior Window Frame Caulk, Off White	NAD	NAD
35	35A	West Façade	Exterior Door Frame Caulk, Cream	NAD	NAD
35	35B	West Façade	Exterior Door Frame Caulk, Cream	NAD	NAD
36	36A	West Façade	Exterior Window Frame Caulk, Tan	NAD	NAD
36	36B	West Façade	Exterior Window Frame Caulk, Tan	NAD	NAD
37	37A	West Façade	Exterior Louver Caulk, Grey	NAD	NAD
37	37B	West Façade	Exterior Louver Caulk, Grey	NAD	NAD
38	38A	Stage Roof	Roof Fabric	NAD	NAD
38	38B	Stage Roof	Roof Fabric	NAD	NAD
39	39A	Stage Roof	Roof Tar	NAD	NAD
39	39B	Stage Roof	Roof Tar	NAD	NAD
40	40A	Stage Roof	Roof Decking	NAD	NAD
40	40B	Stage Roof	Roof Decking	NAD	NAD

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**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: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Attn: **Craig Napolitano**
The Louis Berger Group, Inc.
48 Wall St.
16th Floor
New York, NY 10005

Phone: (212) 612-7900
 Fax:
 Received: 08/21/13 11:00 AM
 Analysis Date: 8/24/2013
 Collected: 8/21/2013

Project: 3000828.00/ WHITE PLANES SCHOOL DISTRICT / H2M/ ROCHAMBEAU SCHOOL WHITE PLAINS, NY / INTERIOR LOCATIONS STAGE

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 01A 031333041-0001		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 2 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		45.00% Ca Carbonate 55.00% 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 01B 031333041-0002		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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 01C 031333041-0003		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 5 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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 01D 031333041-0004		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White	5.00% Glass	55.00% 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 01E 031333041-0005		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	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

Initial Report From 08/25/2013 17:59:24

**EMSL Analytical, Inc.**

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EMSL Order: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	01F	Description	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 15		
	031333041-0006	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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	01G	Description	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 17		
	031333041-0007	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		50.00% Ca Carbonate 50.00% 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	01H	Description	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 19		
	031333041-0008	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		63.00% 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	01I	Description	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 20		
	031333041-0009	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable	8/24/2013	White/Yellow		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	02A	Description	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 2		
	031333041-0010	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		45.00% Quartz 35.00% 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

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EMSL Order: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			Asbestos
Test		Color	Fibrous	Non-Fibrous	
Sample ID 02B 031333041-0011		Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Gray		45.00% Quartz 55.00% 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 02C 031333041-0012		Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 5 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		43.00% Quartz 35.00% 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 02D 031333041-0013		Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		46.00% Quartz 35.00% Gypsum 19.00% 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 02E 031333041-0014		Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		35.00% Quartz 30.00% 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
Sample ID 02F 031333041-0015		Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 15 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		42.00% Quartz 38.00% 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

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EMSL Order: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	02G 031333041-0016	Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		45.00% Quartz 25.00% Gypsum 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	02H 031333041-0017	Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 19 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		40.00% Quartz 37.00% Gypsum 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
Sample ID	02I 031333041-0018	Description Homogeneity	CEILING PLASTER BROWN COAT - FUNCTIONAL SPACE 20 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown		52.00% Quartz 48.00% 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	03A 031333041-0019	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 2 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	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	03B 031333041-0020	Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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

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EMSL Order: 031333041
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 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			Asbestos
Test		Color	Fibrous	Non-Fibrous	
Sample ID 03C 031333041-0021		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 5 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	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 03D 031333041-0022		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	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 03E 031333041-0023		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		52.00% Ca Carbonate 48.00% 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 03F 031333041-0024		Description Homogeneity	CEILING PLASTER WHITE COAT - FUNCTIONAL SPACE 15 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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 03G 031333041-0025		Description Homogeneity	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White/Yellow		50.00% Ca Carbonate 50.00% 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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 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	03H 031333041-0026	Description Homogeneity	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 19 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White/Yellow		35.00% Ca Carbonate 65.00% 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	03I 031333041-0027	Description Homogeneity	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 20 Heterogeneous		
PLM NYS 198.1 Friable	8/24/2013	Tan/White		55.00% Ca Carbonate 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	04A 031333041-0028	Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 2 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		43.00% Quartz 35.00% 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	04B 031333041-0029	Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		45.00% Quartz 55.00% 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	04C 031333041-0030	Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 5 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		48.00% Quartz 25.00% Gypsum 27.00% 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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EMSL Order: 031333041
 CustomerID: LOUI56
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 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			Asbestos
Test		Color	Fibrous	Non-Fibrous	
Sample ID 04D 031333041-0031		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		52.00% Quartz 25.00% Gypsum 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
Sample ID 04E 031333041-0032		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		45.00% Quartz 15.00% Gypsum 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 04F 031333041-0033		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 15 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	3.00% Hair	45.00% Quartz 52.00% 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 04G 031333041-0034		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		48.00% Quartz 15.00% Gypsum 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 04H 031333041-0035		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 19 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		25.00% Quartz 30.00% Gypsum 30.00% Non-fibrous (other) 15.00% Vermiculite	
Vermiculite > 10% - Analysis via NYS ELAP 198.6 required.					
PLM NYS 198.6 VCM	8/25/2013	Brown			None Detected
This method does not remove vermiculite and may underestimate the level of asbestos present in a samples containing > 10% vermiculite.					
PLM NYS 198.6 NOB					Not Analyzed
TEM NYS 198.4 NOB					Not Analyzed

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EMSL Order: 031333041
 CustomerID: LOUI56
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Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	04I 031333041-0036	Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 20 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Tan		40.00% Quartz 2.00% Mica 58.00% 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	05A 031333041-0037	Description Homogeneity	CEILING DECK - FUNCTIONAL SPACE 1 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Gray/S	4.00% Glass 15.00% Cellulose	65.00% 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
Sample ID	05B 031333041-0038	Description Homogeneity	CEILING DECK - FUNCTIONAL SPACE 1 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray/Silver	3.00% Cellulose	70.00% Gypsum 27.00% 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	06A 031333041-0039	Description Homogeneity	1X1 CEILING TILE TEXTURED - FUNCTIONAL SPACE 3 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray			None Detected
Sample ID	06B 031333041-0040	Description Homogeneity	1X1 CEILING TILE TEXTURED - FUNCTIONAL SPACE 9 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray			None Detected
Sample ID	07A 031333041-0041	Description Homogeneity	1X1 CEILING TILE TEXTURED MASTIC - FUNCTIONAL SPACE 3 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected

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Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	07B 031333041-0042	Description Homogeneity	1X1 CEILING TILE TEXTURED MASTIC - FUNCTIONAL SPACE 9 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		
Sample ID	08A 031333041-0043	Description Homogeneity	TERRAZZO FLOORING - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	5.00% Quartz 95.00% 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	08B 031333041-0044	Description Homogeneity	TERRAZZO FLOORING - FUNCTIONAL SPACE 8 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Tan/W	15.00% Ca Carbonate 85.00% 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	09A 031333041-0045	Description Homogeneity	INTERIOR BRICK MORTAR - FUNCTIONAL SPACE 3 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	52.00% Quartz 48.00% 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	09B 031333041-0046	Description Homogeneity	INTERIOR BRICK MORTAR - FUNCTIONAL SPACE 9 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown	58.00% Quartz 3.00% Mica 39.00% 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	10A 031333041-0047	Description Homogeneity	EXTERIOR WINDOW FRAME CAULK GREY - WEST EXTERIOR FAÇADE Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		

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Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	10B 031333041-0048	Description Homogeneity	EXTERIOR WINDOW FRAME CAULK GREY - WEST EXTERIOR FAÇADE Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	<1% Chrysotile <1% Total		
Sample ID	11A 031333041-0049	Description Homogeneity	EXTERIOR BRICK MORTAR - WEST EXTERIOR FAÇADE Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Gray	55.00% Quartz 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	11B 031333041-0050	Description Homogeneity	EXTERIOR BRICK MORTAR - SOUTH EXTERIOR FAÇADE Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown	55.00% Quartz 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	12A 031333041-0051	Description Homogeneity	2X4 CEILING TILE PATTERNED / PINHOLE - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	White	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	White	None Detected		
Sample ID	12B 031333041-0052	Description Homogeneity	2X4 CEILING TILE PATTERNED / PINHOLE - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	White	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	White	None Detected		
Sample ID	13A 031333041-0053	Description Homogeneity	1X1 CEILING TILE PINHOLE - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		

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Test Report:Asbestos Analysis of Bulk Material

Non Asbestos					
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	13B 031333041-0054	Description Homogeneity	1X1 CEILING TILE PINHOLE - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		
Sample ID	14A 031333041-0055	Description Homogeneity	1X1 CEILING TILE PINHOLE MASTIC - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		
Sample ID	14B 031333041-0056	Description Homogeneity	1X1 CEILING TILE PINHOLE MASTIC - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		
Sample ID	15A 031333041-0057	Description Homogeneity	BRICK MORTAR - FUNCTIONAL SPACE 11 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	48.00% Quartz 52.00% 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	15B 031333041-0058	Description Homogeneity	BRICK MORTAR - FUNCTIONAL SPACE 11 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/White	50.00% Quartz 10.00% 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	16A 031333041-0059	Description Homogeneity	INTERIOR WINDOW FRAME CAULK GREY - FUNCTIONAL SPACE 11 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	<1% Anthophyllite <1% Total		

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Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos		
Test		Color	Fibrous	Non-Fibrous
Sample ID		Description		Asbestos
16B		INTERIOR WINDOW FRAME CAULK GREY - FUNCTIONAL SPACE 11		
031333041-0060		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray		<1% Anthophyllite <1% Total
Sample ID		Description		
17A		INTERIOR WINDOW FRAME CAULK BEIGE - FUNCTIONAL SPACE 11		
031333041-0061		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Beige		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Beige		<1% Anthophyllite <1% Total
Sample ID		Description		
17B		INTERIOR WINDOW FRAME CAULK BEIGE - FUNCTIONAL SPACE 11		
031333041-0062		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Beige		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Beige		<1% Anthophyllite <1% Total
Sample ID		Description		
18A		EXTERIOR STONE WINDOW SILL CAULK GREY - EAST FAÇADE		
031333041-0063		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray		None Detected
Sample ID		Description		
18B		EXTERIOR STONE WINDOW SILL CAULK GREY - NORTH FAÇADE		
031333041-0064		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray		None Detected
Sample ID		Description		
19A		EXTERIOR BRICK MORTAR NEWER - EAST FAÇADE		
031333041-0065		Homogeneity	Homogeneous	
PLM NYS 198.1 Friable	8/24/2013	Gray	42.00% Quartz 58.00% 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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Page 12

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Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	19B	Description	EXTERIOR BRICK MORTAR NEWER - EAST FAÇADE		
	031333041-0066	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown		60.00% Quartz 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	20A	Description	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 12		
	031333041-0067	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		65.00% 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	20B	Description	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 12		
	031333041-0068	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray/White		35.00% Ca Carbonate 65.00% 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	20C	Description	WALL PLASTER WHITE COAT - FUNCTIONAL SPACE 12		
	031333041-0069	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	White		50.00% Ca Carbonate 50.00% 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	21A	Description	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 12		
	031333041-0070	Homogeneity	Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	4.00% Hair	55.00% Quartz 41.00% 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

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID 21B 031333041-0071		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 12 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	<1% Hair	45.00% Quartz 35.00% 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 21C 031333041-0072		Description Homogeneity	WALL PLASTER BROWN COAT - FUNCTIONAL SPACE 12 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown		55.00% Quartz 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 22A 031333041-0073		Description Homogeneity	PIPE JOINT TO FIBERGLASS PIPE INSULATION - FUNCTIONAL SPACE 18 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	55.00% Min. Wool	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 22B 031333041-0074		Description Homogeneity	PIPE JOINT TO FIBERGLASS PIPE INSULATION - FUNCTIONAL SPACE 18 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown/Gray	52.00% Min. Wool	48.00% 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 22C 031333041-0075		Description Homogeneity	PIPE JOINT TO FIBERGLASS PIPE INSULATION - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown	30.00% Min. Wool	70.00% 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 23A 031333041-0076		Description Homogeneity	INTERIOR BRICK MORTAR (FOUNDATION BRICK) - FUNCTIONAL SPACE 18 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray		60.00% Quartz 15.00% Ca Carbonate 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

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Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID 23B 031333041-0077	Description Homogeneity	INTERIOR BRICK MORTAR (FOUNDATION BRICK) - FUNCTIONAL SPACE 19 Heterogeneous			
PLM NYS 198.1 Friable	8/24/2013	Brown/White/		55.00% Quartz 2.00% Mica 43.00% 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 24A 031333041-0078	Description Homogeneity	PIPE GASKET - FUNCTIONAL SPACE 18 Heterogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected
Sample ID 24B 031333041-0079	Description Homogeneity	PIPE GASKET - FUNCTIONAL SPACE 18 Heterogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected
Sample ID 25A 031333041-0080	Description Homogeneity	1X1 CEILING TILE PINHOLE - FUNCTIONAL SPACE 17 Heterogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected
Sample ID 25B 031333041-0081	Description Homogeneity	1X1 CEILING TILE PINHOLE - FUNCTIONAL SPACE 17 Heterogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected
Sample ID 26A 031333041-0082	Description Homogeneity	1X1 CEILING TILE PINHOLE MASTIC - FUNCTIONAL SPACE 17 Heterogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Brown			None Detected

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Test Report:Asbestos Analysis of Bulk Material

Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	26B 031333041-0083	Description Homogeneity	1X1 CEILING TILE PINHOLE MASTIC - FUNCTIONAL SPACE 17 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Brown	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Brown	None Detected		
Sample ID	27A 031333041-0084	Description Homogeneity	1X1 CEILING TILE SPLINE - FUNCTIONAL SPACE 17 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		
Sample ID	27B 031333041-0085	Description Homogeneity	1X1 CEILING TILE SPLINE - FUNCTIONAL SPACE 17 Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		
Sample ID	28A 031333041-0086	Description Homogeneity	CMU MORTAR - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Gray	60.00% Quartz 10.00% 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	28B 031333041-0087	Description Homogeneity	CMU MORTAR - FUNCTIONAL SPACE 17 Homogeneous		
PLM NYS 198.1 Friable	8/24/2013	Brown	45.00% Quartz 55.00% 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	29A 031333041-0088	Description Homogeneity	CAULKING TO EXTERIOR STONE WINDOW DETAILING - EAST FAÇADE Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/24/2013	Gray	None Detected		

**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:	031333041
CustomerID:	LOUI56
CustomerPO:	3000828.00
ProjectID:	

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos		
Test		Color	Fibrous	Non-Fibrous
Sample ID		Description		Asbestos
29B		CAULKING TO EXTERIOR STONE WINDOW DETAILING - EAST FAÇADE		
031333041-0089		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray		None Detected
Sample ID		Description		
30A		PUTTY TO MAIN ENTRY DOOR WINDOWS - EAST FAÇADE MAIN ENTRANCE		
031333041-0090		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray /Red /Beige		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray /Red /Beige		<1% Anthophyllite <1% Total
Sample ID		Description		
30B		PUTTY TO MAIN ENTRY DOOR WINDOWS - EAST FAÇADE MAIN ENTRANCE		
031333041-0091		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray /Red /Beige		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray /Red /Beige		<1% Anthophyllite <1% Total
Sample ID		Description		
31A		EXTERIOR DOOR FRAME CAULK TAN - SOUTH FAÇADE		
031333041-0092		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Tan		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Tan		None Detected
Sample ID		Description		
31B		EXTERIOR DOOR FRAME CAULK TAN - SOUTH FAÇADE		
031333041-0093		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Tan		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Tan		None Detected
Sample ID		Description		
32A		EXTERIOR GARAGE DOOR FRAME BEIGE - WEST FAÇADE		
031333041-0094		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Beige		3.7% Chrysotile 3.7% Total
TEM NYS 198.4 NOB	8/24/2013			Not Analyzed

Initial Report From 08/25/2013 17:59:24

**EMSL Analytical, Inc.**

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

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

EMSL Order: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos			
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID 32B 031333041-0095	Description Homogeneity	EXTERIOR GARAGE DOOR FRAME BEIGE - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013				Positive Stop (Not Analyzed)
TEM NYS 198.4 NOB	8/24/2013				Not Analyzed
Sample ID 33A 031333041-0096	Description Homogeneity	EXTERIOR GARAGE DOOR FRAME GREY - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray			None Detected
Sample ID 33B 031333041-0097	Description Homogeneity	EXTERIOR GARAGE DOOR FAME CAULK GREY - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	Gray			<1% Anthophyllite <1% Total
Sample ID 34A 031333041-0098	Description Homogeneity	EXTERIOR GARAGE FRAME CAULK OFF WHITE - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	White			None Detected
Sample ID 34B 031333041-0099	Description Homogeneity	EXTERIOR GARAGE FRAME CAULK OFF WHITE - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/24/2013	White			None Detected
Sample ID 35A 031333041-0100	Description Homogeneity	EXTERIOR DOOR FRAME CAULK CREAM - WEST FAÇADE			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Cream			Inconclusive: None Detected
TEM NYS 198.4 NOB	8/25/2013	Cream			None Detected

**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: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Non Asbestos					
Test		Color	Fibrous	Non-Fibrous	Asbestos
Sample ID	35B	Description	EXTERIOR DOOR FRAME CAULK CREAM - WEST FAÇADE		
	031333041-0101	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Cream	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Cream	None Detected		
Sample ID	36A	Description	EXTERIOR DOOR FRAME CAULK TAN - WEST FAÇADE		
	031333041-0102	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Tan	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Tan	None Detected		
Sample ID	36B	Description	EXTERIOR DOOR FRAME CAULK TAN - WEST FAÇADE		
	031333041-0103	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Tan	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Tan	None Detected		
Sample ID	37A	Description	EXTERIOR LOUVER CAULK GREY - WEST FAÇADE		
	031333041-0104	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Gray	None Detected		
Sample ID	37B	Description	EXTERIOR LOUVER CAULK GREY - WEST FAÇADE		
	031333041-0105	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Gray	None Detected		
Sample ID	38A	Description	ROOF FABRIC - STAGE ROOF		
	031333041-0106	Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Black	Inconclusive: None Detected		
TEM NYS 198.4 NOB	8/25/2013	Black	None Detected		

**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: 031333041
 CustomerID: LOUI56
 CustomerPO: 3000828.00
 ProjectID:

Test Report:Asbestos Analysis of Bulk Material

		Non Asbestos		
Test		Color	Fibrous	Non-Fibrous
Sample ID		Description		Asbestos
38B		ROOF FABRIC - STAGE ROOF		
031333041-0107		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Black		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/25/2013	Black		None Detected
Sample ID		Description		
39A		ROOF TAR - STAGE ROOF		
031333041-0108		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Black		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/25/2013	Black		None Detected
Sample ID		Description		
39B		ROOF TAR - STAGE ROOF		
031333041-0109		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Black		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/25/2013	Black		None Detected
Sample ID		Description		
40A		ROOF DECKING - STAGE ROOF		
031333041-0110		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/25/2013	Gray		None Detected
Sample ID		Description		
40B		ROOF DECKING - STAGE ROOF		
031333041-0111		Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	8/22/2013	Gray		Inconclusive: None Detected
TEM NYS 198.4 NOB	8/25/2013	Gray		None Detected

**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: 031333041
CustomerID: LOUI56
CustomerPO: 3000828.00
ProjectID:

Test Report: Asbestos Analysis of Bulk Material

Test	Color	Non Asbestos		Asbestos
		Fibrous	Non-Fibrous	

Scope: Leica #8 Ser. 9640013510UN0022

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:

Scope: Leica #8 Ser. 9640013510UN0022

Sample Receipt Date:: 8/21/2013 Sample Receipt Time: 11:00 AM

Analysis Completed Date: 8/24/2013 Analysis Completed Time: 11:49 AM

Analyst(s):

Henry Akintunde PLM NYS 198.1 Friable (47)

Jon Williams PLM NYS 198.1 Friable (14)

Kamel Alawawda PLM NYS 198.6 NOB (49)

Jon Williams PLM NYS 198.6 VCM (1)

Sean Scales TEM NYS 198.4 NOB (48)

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



THE LOUIS BERGER
GROUP, INC.

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 1 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Planes School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 812-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: X 96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
01	01A	Ceiling Plaster, White Coat	Functional Space 2		
01	01B	Ceiling Plaster, White Coat	Functional Space 3		
01	01C	Ceiling Plaster, White Coat	Functional Space 5		
01	01D	Ceiling Plaster, White Coat	Functional Space 8	03/333041	
01	01E	Ceiling Plaster, White Coat	Functional Space 9		
01	01F	Ceiling Plaster, White Coat	Functional Space 15		
01	01G	Ceiling Plaster, White Coat	Functional Space 17		
01	01H	Ceiling Plaster, White Coat	Functional Space 19		
01	01I	Ceiling Plaster, White Coat	Functional Space 20		
02	02A	Ceiling Plaster, Brown Coat	Functional Space 2		
02	02B	Ceiling Plaster, Brown Coat	Functional Space 3		
02	02C	Ceiling Plaster, Brown Coat	Functional Space 5		

CHAIN OF CUSTODY

Relinquished by: Cheskin	Relinquished by: Garcia	Relinquished by:	Relinquished by:	Relinquished by:
Received by: Napolitano	Received by: [Signature]	Received by:	Received by:	Received by:
8/19/13	8/19/13			
11:41 AM				

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

031333041



THE LOUIS BERGER
GROUP, INC.

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 2 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Planes School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: **X** 00 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
02	02D	Ceiling Plaster, Brown Coat	Functional Space 8		
02	02E	Ceiling Plaster, Brown Coat	Functional Space 9		
02	02F	Ceiling Plaster, Brown Coat	Functional Space 15		
02	02G	Ceiling Plaster, Brown Coat	Functional Space 17		
02	02H	Ceiling Plaster, Brown Coat	Functional Space 19		
02	02I	Ceiling Plaster, Brown Coat	Functional Space 20		
03	03A	Wall Plaster, White Coat	Functional Space 2	03333041	
03	03B	Wall Plaster, White Coat	Functional Space 3		
03	03C	Wall Plaster, White Coat	Functional Space 5		
03	03D	Wall Plaster, White Coat	Functional Space 8		
03	03E	Wall Plaster, White Coat	Functional Space 9		
03	03F	Wall Plaster, White Coat	Functional Space 15		

CHAIN OF CUSTODY

Relinquished by: <i>D. Cheskin</i>	(Date) <i>8/19/13</i>	(Time)	Relinquished by: <i>D. Garcia</i>	(Date) <i>8/20/13</i>	(Time) <i>11AM</i>	Relinquished by:	(Date)	(Time)	Relinquished by:	(Date)	(Time)
Received by: <i>D. Cheskin</i>	(Date) <i>8/20/13</i>	(Time)	Received by: <i>D. Garcia</i>	(Date) <i>8/20/13</i>	(Time) <i>11AM</i>	Received by:	(Date)	(Time)	Received by:	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

03133 3041

PROJECT NO.: 3000828.00 CLIENT: White Planes School District/H2M PROJECT SITE: Rochambeau School, White Plains, NY Project Manager: C. Napolitano	LOCATION(S) SURVEYED: Interior Locations, Stage Roof PROPOSED PROJECT: HVAC Upgrades DATE(S) OF INSPECTION: 8/19/13 Inspector(s): Drew Cheskin & Josue Garcia
--	--

THE LOUIS BERGER GROUP, INC. TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 383-4341 ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005	RESULTS TO: acheskin@louisberger.com cnapolitano@louisberger.com jgarcia@louisberger.com	TURNAROUND TIME: X 96 HR.
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HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
03	03G	Wall Plaster, White Coat	Functional Space 17		
03	03H	Wall Plaster, White Coat	Functional Space 19		
03	03I	Wall Plaster, White Coat	Functional Space 20		
04	04A	Wall Plaster, Brown Coat	Functional Space 2		
04	04B	Wall Plaster, Brown Coat	Functional Space 3		
04	04C	Wall Plaster, Brown Coat	Functional Space 5		
04	04D	Wall Plaster, Brown Coat	Functional Space 8		
04	04E	Wall Plaster, Brown Coat	Functional Space 9		
04	04F	Wall Plaster, Brown Coat	Functional Space 15		
04	04G	Wall Plaster, Brown Coat	Functional Space 17		
04	04H	Wall Plaster, Brown Coat	Functional Space 19		
04	04I	Wall Plaster, Brown Coat	Functional Space 20		

CHAIN OF CUSTODY											
Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Drew Cheskin	[Signature]	8/21/13									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Josue Garcia	[Signature]	8/21	11Am								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

031333041

2

PROJECT NO.: 3000828.00 CLIENT: White Planes School District/H2M PROJECT SITE: Rochambeau School, White Plains, NY Project Manager: C. Napolitano	LOCATION(S) SURVEYED: Interior Locations, Stage Roof PROPOSED PROJECT: HVAC Upgrades DATE(S) OF INSPECTION: 8/19/13 Inspector(s): Drew Cheskin & Josue Garcia
--	--

THE LOUIS BERGER GROUP, INC. TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341 ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005	RESULTS TO: acheskin@louisberger.com cnapolitano@louisberger.com jgarcia@louisberger.com	TURNAROUND TIME: X 96 HR.
---	---	----------------------------------

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
05	05A	Ceiling Deck	Functional Space 1		
05	05B	Ceiling Deck	Functional Space 1		
06	06A	1'x1' Ceiling Tile, Textured	Functional Space 3		
06	06B	1'x1' Ceiling Tile, Textured	Functional Space 9		
07	07A	1'x1' Ceiling Tile, Textured, Mastic	Functional Space 3		
07	07B	1'x1' Ceiling Tile, Textured, Mastic	Functional Space 9		
08	08A	Terrazzo Flooring	Functional Space 3		
08	08B	Terrazzo Flooring	Functional Space 8	0313	33041
09	09A	Interior Brick Mortar	Functional Space 3		
09	09B	Interior Brick Mortar	Functional Space 9		
10	10A	Exterior Window Frame Caulk, Grey	West Exterior Façade		
10	10B	Exterior Window Frame Caulk, Grey	East Exterior Façade		

CHAIN OF CUSTODY											
Relinquished by:	(Date)	(Time)	Relinquished by:	(Date)	(Time)	Relinquished by:	(Date)	(Time)			
<i>D. Cheskin</i>	<i>8/21/13</i>										
Received by:	(Date)	(Time)	Received by:	(Date)	(Time)	Received by:	(Date)	(Time)			
<i>Josue Garcia</i>	<i>8/21</i>	<i>11AM</i>									

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

031333041

	THE LOUIS BERGER GROUP, INC.	ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY	PAGE 5 OF 10
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PROJECT NO.: 3000828.00

CLIENT: White Plains School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
 TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
 ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: **X** 96 HR.


HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
11	11A	Exterior Brick Mortar	West Exterior Façade		
11	11B	Exterior Brick Mortar	South Exterior Façade		
12	12A	2'x4' Ceiling Tile, Patterned/Pinhole	Functional Space 11		
12	12B	2'x4' Ceiling Tile, Patterned/Pinhole	Functional Space 11		
13	13A	1'x1' Ceiling Tile, Pinhole	Functional Space 11		Above 2'x4' CT
13	13B	1'x1' Ceiling Tile, Pinhole	Functional Space 11		Above 2'x4' CT
14	14A	1'x1' Ceiling Tile, Pinhole, Mastic	Functional Space 11		
14	14B	1'x1' Ceiling Tile, Pinhole, Mastic	Functional Space 11		
15	15A	Brick Mortar	Functional Space 11		Old Gymnasium
15	15B	Brick Mortar	Functional Space 11		Old Gymnasium
16	16A	Interior Window Frame Caulk, Grey	Functional Space 11		To Window with A/C Units
16	16B	Interior Window Frame Caulk, Grey	Functional Space 11		To Window with A/C Units

CHAIN OF CUSTODY

Relinquished by: <i>D. Cheskin</i>	(Date) <i>8/21/13</i>	(Time)	Relinquished by: <i>D. Cheskin</i>	(Date)	(Time)	Relinquished by: <i>D. Cheskin</i>	(Date)	(Time)
Received by: <i>J. Napolitano</i>	(Date) <i>8/21/13</i>	(Time) <i>12:00 PM</i>	Received by: <i>J. Napolitano</i>	(Date)	(Time)	Received by: <i>J. Napolitano</i>	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

03133041 031333041

	THE LOUIS BERGER GROUP, INC.	ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY				PAGE 6 OF 10
PROJECT NO.: 3000828.00 CLIENT: White Planes School District/H2M PROJECT SITE: Rochambeau School, White Plains, NY Project Manager: C. Napolitano			LOCATION(S) SURVEYED: Interior Locations, Stage Roof PROPOSED PROJECT: HVAC Upgrades DATE(S) OF INSPECTION: 8/19/13 Inspector(s): Drew Cheskin & Josue Garcia			
THE LOUIS BERGER GROUP, INC. TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341 ADDRESS: 46 Wall Street 16th Floor, New York, NY 10005			RESULTS TO: acheskin@louisberger.com cnapolitano@louisberger.com jgarcia@louisberger.com		TURNAROUND TIME: X 96 HR.	
HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES	
17	17A	Interior Window Frame Caulk, Beige —	Functional Space 11		To A/C Units	
17	17B	Interior Window Frame Caulk, Beige —	Functional Space 11		To A/C Units	
18	18A	Exterior Stone Window Sill Caulk, Grey ✓	East Façade			
18	18B	Exterior Stone Window Sill Caulk, Grey —	North Façade			
19	19A	Exterior Brick Mortar (newer)	East Façade			
19	19B	Exterior Brick Mortar (newer)	East Façade			
20	20A	Wall Plaster, White Coat	Functional Space 12		Auditorium Stage	
20	20B	Wall Plaster, White Coat	Functional Space 12		Auditorium Stage	
20	20B	Wall Plaster, White Coat	Functional Space 12		Auditorium Stage	
21	21A	Wall Plaster, Brown Coat	Functional Space 12		Auditorium Stage	
21	21B	Wall Plaster, Brown Coat	Functional Space 12		Auditorium Stage	
21	21B	Wall Plaster, Brown Coat	Functional Space 12		Auditorium Stage	

CHAIN OF CUSTODY											
Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)	Relinquished by:	(Sign)	(Date)	(Time)
Drew Cheskin	(Signature)	8/21/13									
Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)	Received by:	(Sign)	(Date)	(Time)
Yancy Gibson	(Signature)	8/21	11am								

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.



**THE LOUIS BERGER
GROUP, INC.**

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 7 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Planes School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: **X** 96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
22	22A	Pipe Joint to Fiberglass Pipe Insulation	Functional Space 18		
22	22B	Pipe Joint to Fiberglass Pipe Insulation	Functional Space 18		
22	22C	Pipe Joint to Fiberglass Pipe Insulation	Functional Space 17		
23	23A	Interior Brick Mortar (Foundation Brick)	Functional Space 18		
23	23B	Interior Brick Mortar (Foundation Brick)	Functional Space 19		
24	24A	Pipe Gasket ✓	Functional Space 18		
24	24B	Pipe Gasket -	Functional Space 18		
25	25A	1'x1' Ceiling Tile, Pinhole ✓	Functional Space 17		
25	25B	1'x1' Ceiling Tile, Pinhole -	Functional Space 17		
26	26A	1'x1' Ceiling Tile, Pinhole, Mastic ✓	Functional Space 17		
26	26B	1'x1' Ceiling Tile, Pinhole, Mastic ✓	Functional Space 17		
27	27A	1"x1" Ceiling Tile, Spline ✓	Functional Space 17		

031333041

CHAIN OF CUSTODY

Relinquished by: <i>Drew Cheskin</i> (Sign)	(Date) 8/21/13	(Time)	Relinquished by: (Sign)	(Date)	(Time)	Relinquished by: (Sign)	(Date)	(Time)
Received by: <i>Josue Garcia</i> (Sign)	(Date) 8/21	(Time) 11am	Received by: (Sign)	(Date)	(Time)	Received by: (Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.



**THE LOUIS BERGER
GROUP, INC.**

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 8 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Planes School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: X 96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
27	27B	1"x1" Ceiling Tile, Spline —	Functional Space 17		
28	28A	CMU Mortar	Functional Space 17		
28	28B	CMU Mortar	Functional Space 17		
29	29A	Caulking to Exterior Stone Window Detailing —	East Façade		
29	29B	Caulking to Exterior Stone Window Detailing —	East Façade	031333001	
30	30A	Putty to Main Entry Door Windows —	East Façade, Main Entrance		
30	30B	Putty to Main Entry Door Windows —	East Façade, Main Entrance		
31	31A	Exterior Door Frame Caulk, Tan —	South Façade		
31	31B	Exterior Door Frame Caulk, Tan —	South Façade		
32	32A	Exterior Garage Door Frame Caulk, Beige —	West Façade		
32	32B	Exterior Garage Door Frame Caulk, Beige —	West Façade		
33	33A	Exterior Garage Door Frame Caulk, Grey —	West Façade		

CHAIN OF CUSTODY

Relinquished by: <i>Drew Cheskin</i> (Sign)	(Date) 8/21/13	(Time)	Relinquished by: (Sign)	(Date)	(Time)	Relinquished by: (Sign)	(Date)	(Time)
Received by: <i>Josue Garcia</i> (Sign)	(Date) 8/21	(Time) 11 AM	Received by: (Sign)	(Date)	(Time)	Received by: (Sign)	(Date)	(Time)

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.



**THE LOUIS BERGER
GROUP, INC.**

ASBESTOS SURVEY DATA SHEET / CHAIN OF CUSTODY

PAGE 9 OF 10

PROJECT NO.: 3000828.00

CLIENT: White Plains School District/H2M

PROJECT SITE: Rochambeau School, White Plains, NY

Project Manager: C. Napolitano

LOCATION(S) SURVEYED: Interior Locations, Stage Roof

PROPOSED PROJECT: HVAC Upgrades

DATE(S) OF INSPECTION: 8/19/13

Inspector(s): Drew Cheskin & Josue Garcia

THE LOUIS BERGER GROUP, INC.
TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341
ADDRESS: 48 Wall Street 16th Floor, New York, NY 10005

RESULTS TO: acheskin@louisberger.com
cnapolitano@louisberger.com
jgarcia@louisberger.com

TURNAROUND TIME: **X** 96 HR.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
33	33B	Exterior Garage Door Frame Caulk, Grey —	West Façade		
34	34A	Exterior Window Frame Caulk, Off White —	West Façade		
34	34B	Exterior Window Frame Caulk, Off White —	West Façade		
35	35A	Exterior Door Frame Caulk, Cream —	West Façade		
35	35B	Exterior Door Frame Caulk, Cream —	West Façade		
36	36A	Exterior Window Frame Caulk, Tan —	West Façade		
36	36B	Exterior Window Frame Caulk, Tan —	West Façade		
37	37A	Exterior Louver Caulk, Grey —	West Façade		
37	37B	Exterior Louver Caulk, Grey —	West Façade		
38	38A	Roof Fabric —	Stage Roof		Top Layer, Over Foam
38	38B	Roof Fabric —	Stage Roof		Top Layer, Over Foam
39	39A	Roof Tar —	Stage Roof		Third Layer, Below Foam

CHAIN OF CUSTODY

Relinquished by: <i>Drew Cheskin</i>	(Date) <i>8/21/13</i>	Relinquished by: <i>Drew Cheskin</i>	(Date) <i>8/21/13</i>	Relinquished by: <i>Drew Cheskin</i>	(Date) <i>8/21/13</i>	Relinquished by: <i>Drew Cheskin</i>	(Date) <i>8/21/13</i>	Relinquished by: <i>Drew Cheskin</i>	(Date) <i>8/21/13</i>	Relinquished by: <i>Drew Cheskin</i>	(Date) <i>8/21/13</i>
Received by: <i>Josue Garcia</i>	(Date) <i>8/21/13</i>	Received by: <i>Josue Garcia</i>	(Date) <i>8/21/13</i>	Received by: <i>Josue Garcia</i>	(Date) <i>8/21/13</i>	Received by: <i>Josue Garcia</i>	(Date) <i>8/21/13</i>	Received by: <i>Josue Garcia</i>	(Date) <i>8/21/13</i>	Received by: <i>Josue Garcia</i>	(Date) <i>8/21/13</i>

General Notes: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

**DRAFT REPORT FOR
ASBESTOS INSPECTION SERVICES**

Performed at:

**ROCHAMBEAU SCHOOL
228 FISHER AVE.
WHITE PLAINS, NY 10606**

Prepared for:



**508 North Street
White Plains, NY 10605**

Prepared by:



Louis Berger

**565 Taxter Road, 5th Floor
Elmsford, New York 10523**

Tel. (914) 798-3710

Fax (914) 592-1734

Project No.: 2042261.035

Draft Submission Date: March 22, 2018



Louis Berger

565 Taxter Road, 5th Floor, Elmsford, NY 10523
Tel 914 798 3710 Fax 914 592 1734

www.louisberger.com

March 22, 2018

Mr. Frank Stefanelli
Director of Facilities
White Plains City School District
508 North Street
White Plains, NY 10605

Subject: Draft Report of Asbestos Inspection Services
Rochambeau School
228 Fisher Ave.
White Plains, NY 10606

Dear Mr. Stefanelli:

Louis Berger (Berger) has completed a material inspection at Rochambeau School located at 228 Fisher Ave., White Plains, NY 10606. The inspection included visual observation, material sampling, and laboratory sample analysis of suspect Asbestos-Containing Materials (ACM) associated with the upcoming Roof Replacement Project at the Rochambeau School.

The attached report presents descriptions and results of the material sampling procedures and visual analysis. Relevant general project information is provided, followed by our findings, assessments and recommendations. Laboratory analysis data and certifications are provided in the Appendices.

If you have any questions concerning this report or if we may be of further assistance to you, please contact us.

Sincerely,

LOUIS BERGER (LB)

Craig Napolitano, CHMM
Vice President, Emergency Management & IH Services



TABLE OF CONTENTS

	Page
1.0 EXECUTIVE SUMMARY	1
2.0 FIELD INSPECTION PROCEDURES AND SAMPLE ANALYSIS METHODS	4
3.0 INSPECTION SCOPE AND MATERIAL ASSESSMENT	6
4.0 INSPECTION RESULTS.....	9
5.0 AREAS NOT ACCESSIBLE.....	10
6.0 CONCLUSIONS AND RECOMMENDATIONS	11
7.0 REPORT CERTIFICATIONS	11

Appendices

Appendix A: Asbestos Sample Analysis Results in Tabular Form

Appendix B: Asbestos Bulk Sample Field Data Sheets with Chain of Custody & Laboratory Results

Appendix C: Asbestos Bulk Sample Location Drawings

Appendix D: Asbestos Containing Materials Location Drawings

Appendix E: Company License, Personnel Certifications and Laboratory Accreditations

Appendix F: Photographic Documentation

Appendix G: File Search

1.0 EXECUTIVE SUMMARY

Berger has performed a material inspection for the presence or absence of Asbestos-Containing Materials (ACM) at the Rochambeau School located at 228 Fisher Ave., White Plains, NY 10606. The intent of this inspection was to screen for Asbestos-Containing Materials (ACM) that may be impacted during the upcoming Roof Replacement Project at the Rochambeau School.

Marvin Luccioni of LB performed this inspection on March 15th, 2018. Mr. Luccioni is licensed as a New York State Department of Labor (NYSDOL) Asbestos Inspector (Cert# 03-11021). The results of the visual inspection and bulk sample analysis determined that the following suspect ACM materials may be impacted by the upcoming Roof Replacement Project at the Rochambeau School:

A. ASBESTOS-CONTAINING MATERIAL

Analytical results of the bulk samples collected on 03/15/18 by Berger indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Perimeter Flashing, Black (Roofs A-C, E & G-L)**
- **Coping Stone Caulking, Gray (Roofs A-C & E, G-L)**

Analytical results of the bulk samples collected on 08/19/13 by Berger indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Exterior Garage Door Frame Caulk, Beige & Gray¹**

As per 2016 AHERA, the following materials **contain asbestos** (greater than 1-percent);

- **9"x9" Floor Tile/Mastic (Throughout)¹**
- **Wall Plaster (Auditorium)¹**
- **Wire Insulation (Stage)¹**

Note: 1. ACM will not be disturbed as part of the Roof Replacement Project.

Analytical results of the bulk samples collected on 03/15/18 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Concrete, Gray (Bot. Layer Substrate, Roofs A-C & E-L)
- Vapor Barrier Tar under EPDM Membrane, Black (Roofs A-C & E-L)
- Laid Scrim over Foam, Black (Top Layer, Roofs A-L)
- Sealant to Skylight (Roofs B-D & J)
- Skylight Flashing, Black (Roofs B-C & J)
- Exhaust Flashing, Black (Roofs A-C & E-L)
- Coping Stone Mortar, Gray/Brown (Roofs A-C & E-L)
- Brick Mortar, Gray (Roofs A-L)
- Chimney Mortar, Gray/Brown (Roof A)

- Parapet Brick Mortar, Gray/Brown (Roofs A-C & E-L)
- Tar on Conduits & Flashing, Black (Roof C)
- Caulking on Exhaust, Beige (Roof E)
- Window Frame Caulking, Beige (Roofs A, C, E, K & I)
- Coating above Windows, Beige (Roofs A, C, E, K & I)
- Caulking on Cap, Gray (Roofs A-C & E-L)
- Caulking on Cap, Black (Roofs A-C & E-L)
- Pitch Pocket Tar, Black (Roof I)
- Roof Shingles & Felt Paper, Black (Sloped Roof)
- Felt Paper to Foam Insulation under EPDM Membrane, Black (Roof F)
- Caulking to Cap Flash, Gray (Roof F)
- Skylight Flashing, Black (Roof D)
- Caulking on Cap & Skylight, Beige (Roof D)
- Screed, Gray (Bot. Layer Substrate, Roof D)
- Tar to Foam Insulation, Black (3rd Layer, Roof D)
- Perlite Insulation, Brown (2nd Layer, Roof D)
- Roof Membrane, Black (Top Layer, Roof D)
- Exterior Expansion Joint Caulking, Gray (Exterior Façade)

Analytical results of the bulk samples collected and/or visual examination on 06/03/16 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Pipe Insulation/Elbows to Fiberglass Pipe Insulation, Gray (Large)
- Pipe Insulation/Elbows to Fiberglass Pipe Insulation, Gray (Medium)

Analytical results of the bulk samples collected and/or visual examination on LB previous survey report dated 10/08/13 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- 2'x4' Large Gouged Ceiling Tiles, White
- 2x4' Fissured Ceiling Tiles, White
- 1'x1' Gouged Ceiling Tiles, Gray
- 2'x4' Gouged Ceiling Tiles, White
- 2'x4' Stripe Design Ceiling Tiles, White
- 2'x4' Fissured/Pinhole Ceiling Tiles
- 1'x1' Ceiling Tiles, Textured
- 2'x4' Ceiling Tiles, Patterned/Pinhole (Old Gymnasium)
- 1'x1' Ceiling Tiles, Pinhole (Old Gymnasium)
- 1'x1' Ceiling Tiles, (Cafeteria)
- 1'x1' Ceiling Tiles, Spline

Analytical results of the bulk samples collected and/or visual examination on LB previous survey report dated 08/19/13 indicate that the following materials **did not contain asbestos** (less than 1-percent);



- Ceiling Plaster, White & Brown Coats (Throughout)
- Wall Plaster, White & Brown Coats (Throughout)
- Ceiling Deck
- 1'x1' Ceiling Tiles, Textured
- 1'x1' Ceiling Tiles, Textured Mastic
- Terrazzo Flooring
- Interior Brick Mortar
- Exterior Window Frame Caulking, Gray
- Exterior Brick Mortar
- 2'x4' Ceiling Tiles, Patterned/Pinhole
- 1'x1' Ceiling Tiles, Pinhole
- 1'x1' Ceiling Tiles, Pinhole Mastic
- Interior Window Frame Caulk, Gray
- Interior Window Frame Caulk, Beige
- Exterior Stone Window Sill Caulk, Gray
- Exterior Brick Mortar, (Newer)
- Pipe Joint to Fiberglass Pipe Insulation
- Pipe Gasket
- 1'x1' Ceiling Tiles, Pinhole
- 1'x1' Ceiling Tiles, Pinhole Mastic
- 1'x1' Ceiling Tiles, Spline
- Cinderblock Mortar, Gray
- Caulking to Exterior Stone Window Detailing
- Putty to Exterior Main Entry Door Windows
- Exterior Door Frame Caulk, Tan
- Exterior Garage Door Frame Caulk, Gray
- Exterior Window Frame Caulk, Off-White
- Exterior Door Frame Caulk, Cream
- Exterior Window Frame Caulk, Tan
- Exterior Louver Caulk, Gray
- Roof Fabric (Stage Roof)
- Roof Tar (Stage Roof)
- Roof Decking (Stage Roof)

2.0 FIELD INSPECTION PROCEDURES AND SAMPLE ANALYSIS METHODS

ASBESTOS-CONTAINING MATERIAL

Guidelines used for the inspection were established by the Environmental Protection Agency (EPA) in the Guidance for Controlling Asbestos Containing Materials in Buildings, Office of Pesticides and Toxic Substances, Doc 560/5-85-024, and 40 CFR Part 763, Asbestos Hazard Emergency Response Act (AHERA)

Field information was organized in accordance with the AHERA methodology of homogenous area (HA). During the Inspection, reasonable effort was made to identify all locations and types of ACM materials associated with the scope of work. Sampling has included multiple samples of the same materials chosen at random. However, due to inconsistencies of a manufacturer's processes and the contractor's installation methods, materials of similar construction may contain various amounts of asbestos. Furthermore, some materials that were not originally specified to contain asbestos may in fact contain this mineral. For example, cementitious pipe insulation and plaster were frequently mixed with asbestos at the construction site for ease of application. Locating all asbestos materials can only be definitively achieved by conducting exploratory demolition and sampling every section of pipe insulation, fitting or valve covering, fireproofing, and other suspect ACM.

Bulk samples of suspect ACM are analyzed using polarized light microscopy (PLM) coupled with dispersion staining, as described in 40 CFR Part 763 and the National Emissions Standard for Hazardous Air Pollutants (NESHAPS). NESHAPS is the standard industry protocol for the determination of asbestos in building materials. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The color displays that result are compared to a standardized atlas whereby the specific variety of asbestos is determined. It should also be recognized that PLM is primarily a qualitative identification method whereby asbestos percentage, if any, is estimated. While EPA, New York State, and New York City regulations governing ACM consider materials containing greater than 1-percent as asbestos, accurately quantifying asbestos content below 5-percent has been shown to be unreliable.

The New York State Department of Health has recently revised the PLM Stratified Point Counting Method. The March 25th, 2011 method, "Polarized Light Microscopy Methods for Identifying and Quantifying Asbestos in Bulk Samples" can be found as Item 198.1 in the Environmental Laboratory Approval program (ELAP) Certification manual. Whereas the procedure of analysis for bulk samples that fall into the category of "Non-friable Organically Bound" (NOB) can be found in the March 25th 2011 method "Polarized-Light Microscope Method for Identifying and Quantifying Asbestos in Non-Friable Organically Bound Bulk Samples", Item 198.6 in the ELAP Certification Manual. This category includes any sample in a flexible to rigid asphalt or vinyl matrix (floor tiles, mastic, roofing shingles, roofing felt, etc.). These samples must be "ashed" in a muffle furnace at 480-degrees Celsius (to remove organic matrix), treated with acid (to remove any mineral carbonate), and filtered through a 0.4-micron polycarbonate filter before being analyzed by PLM. The sample must be weighted between each of these steps to track the percent loss of organic matrix.

ELAP has determined that analysis of NOB materials is not reliably performed by PLM.

Therefore, if PLM analysis yields results of 1-percent asbestos or less, the result must be confirmed by TEM. For bulk samples that undergo TEM analysis, the March 25th, 2011 method “Transmission Electron Microscope Method for Identifying and Quantitating Asbestos in Non-Friable organically Bound Bulk Samples” must be used and can be found as Item 198.4 in the ELAP Certification Manual. ELAP certified laboratories must include the following statement with their PLM analysis results for each “negative” (1-percent or less asbestos) NOB sample: "Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. Before this material can be considered or treated as non-ACM, confirmation must be made by quantitative transmission electron microscopy".

All samples are initially analyzed by Polarized Light Microscopy in accordance with Item 198.1 and 198.6 of the ELAP Certification Manual. Samples which yield a negative PLM result and which are classified as a "non-friable" material, are then re-analyzed utilizing TEM methodology in accordance with Item 198.4 of the ELAP Certification Manual. The laboratory performing both these analysis procedures is EMSL located at 528 Mineola Avenue, Carle Place, NY 11514 and 307 W. 38th St., NY NY 10018. The laboratory has received accreditation from the following agencies:

- National Voluntary Laboratory Accreditation Program (Lab Code 101048-10)
- New York State Environmental Laboratory Approval Program (Lab No. 11469)
- American Industrial Hygiene Association Accredited Laboratory (Lab No. 102581)

3.0 INSPECTION SCOPE AND MATERIAL ASSESSMENT

The areas inspected for ACM materials that may be impacted during the upcoming Roof Replacement Project at the Rochambeau School include:

- Roofs A through L

A. ASBESTOS-CONTAINING MATERIAL

Materials examined during the Berger inspection on 03/15/18 included:

- Concrete, Gray (Bot. Layer Substrate, Roofs A-C & E-L)
- Vapor Barrier Tar under EPDM Membrane, Black (Roofs A-C & E-L)
- Laid Scrim over Foam, Black (Top Layer, Roofs A-L)
- Sealant to Skylight (Roofs B-D & J)
- Skylight Flashing, Black (Roofs B-C & J)
- **Perimeter Flashing, Black (Roofs A-C, E & G-L)**
- Exhaust Flashing, Black (Roofs A-C & E-L)
- Coping Stone Mortar, Gray/Brown (Roofs A-C & E-L)
- Brick Mortar, Gray (Roofs A-L)
- Chimney Mortar, Gray/Brown (Roof A)
- Parapet Brick Mortar, Gray/Brown (Roofs A-C & E-L)
- Tar on Conduits & Flashing, Black (Roof C)
- Caulking on Exhaust, Beige (Roof E)
- Window Frame Caulking, Beige (Roofs A, C, E, K & I)
- Coating above Windows, Beige (Roofs A, C, E, K & I)
- Caulking on Cap, Gray (Roofs A-C & E-L)
- Tar on Cap, Black (Roofs A-C & E-L)
- **Coping Stone Caulking, Gray (Roofs A-C & E, G-L)**
- Pitch Pocket Tar, Black (Roof I)
- Roof Shingles & Felt Paper, Black (Sloped Roof)
- Felt Paper to Foam Insulation under EPDM Membrane, Black (Roof F)
- Caulking to Cap Flash, Gray (Roof F)
- Skylight Flashing, Black (Roof D)
- Caulking on Cap & Skylight, Beige (Roof D)
- Screed, Gray (Bot. Layer Substrate, Roof D)
- Tar to Foam Insulation, Black (3rd Layer, Roof D)
- Perlite Insulation, Brown (2nd Layer, Roof D)
- Roof Membrane, Black (Top Layer, Roof D)
- Exterior Expansion Joint Caulking, Gray (Exterior Façade)

A. ASBESTOS-CONTAINING MATERIAL

Analytical results of the bulk samples collected on 03/15/18 by Berger indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Perimeter Flashing, Black (Roofs A-C, E & G-L)**
- **Coping Stone Caulking, Gray (Roofs A-C & E, G-L)**

Analytical results of the bulk samples collected on 08/19/13 by Berger indicate that the following materials **contain asbestos** (greater than 1-percent).

- **Exterior Garage Door Frame Caulk, Beige & Gray¹**

As per 2016 AHERA, the following materials **contain asbestos** (greater than 1-percent);

- **9"x9" Floor Tile/Mastic (Throughout)¹**
- **Wall Plaster (Auditorium)¹**
- **Wire Insulation (Stage)¹**

Note: 1. ACM will not be disturbed as part of the Roof Replacement Project.

Analytical results of the bulk samples collected on 03/15/18 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Concrete, Gray (Bot. Layer Substrate, Roofs A-C & E-L)
- Vapor Barrier Tar under EPDM Membrane, Black (Roofs A-C & E-L)
- Laid Scrim over Foam, Black (Top Layer, Roofs A-L)
- Sealant to Skylight (Roofs B-D & J)
- Skylight Flashing, Black (Roofs B-C & J)
- Exhaust Flashing, Black (Roofs A-C & E-L)
- Coping Stone Mortar, Gray/Brown (Roofs A-C & E-L)
- Brick Mortar, Gray (Roofs A-L)
- Chimney Mortar, Gray/Brown (Roof A)
- Parapet Brick Mortar, Gray/Brown (Roofs A-C & E-L)
- Tar on Conduits & Flashing, Black (Roof C)
- Caulking on Exhaust, Beige (Roof E)
- Window Frame Caulking, Beige (Roofs A, C, E, K & I)
- Coating above Windows, Beige (Roofs A, C, E, K & I)
- Caulking on Cap, Gray (Roofs A-C & E-L)
- Caulking on Cap, Black (Roofs A-C & E-L)
- Pitch Pocket Tar, Black (Roof I)
- Roof Shingles & Felt Paper, Black (Sloped Roof)
- Felt Paper to Foam Insulation under EPDM Membrane, Black (Roof F)
- Caulking to Cap Flash, Gray (Roof F)
- Skylight Flashing, Black (Roof D)

- Caulking on Cap & Skylight, Beige (Roof D)
- Screed, Gray (Bot. Layer Substrate, Roof D)
- Tar to Foam Insulation, Black (3rd Layer, Roof D)
- Perlite Insulation, Brown (2nd Layer, Roof D)
- Roof Membrane, Black (Top Layer, Roof D)
- Exterior Expansion Joint Caulking, Gray (Exterior Façade)

Analytical results of the bulk samples collected and/or visual examination on 06/03/16 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Pipe Insulation/Elbows to Fiberglass Pipe Insulation, Gray (Large)
- Pipe Insulation/Elbows to Fiberglass Pipe Insulation, Gray (Medium)

Analytical results of the bulk samples collected and/or visual examination on LB previous survey report dated 10/08/13 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- 2'x4' Large Gouged Ceiling Tiles, White
- 2x4' Fissured Ceiling Tiles, White
- 1'x1' Gouged Ceiling Tiles, Gray
- 2'x4' Gouged Ceiling Tiles, White
- 2'x4' Stripe Design Ceiling Tiles, White
- 2'x4' Fissured/Pinhole Ceiling Tiles
- 1'x1' Ceiling Tiles, Textured
- 2'x4' Ceiling Tiles, Patterned/Pinhole (Old Gymnasium)
- 1'x1' Ceiling Tiles, Pinhole (Old Gymnasium)
- 1'x1' Ceiling Tiles, (Cafeteria)
- 1'x1' Ceiling Tiles, Spline

Analytical results of the bulk samples collected and/or visual examination on LB previous survey report dated 08/19/13 indicate that the following materials **did not contain asbestos** (less than 1-percent);

- Ceiling Plaster, White & Brown Coats (Throughout)
- Wall Plaster, White & Brown Coats (Throughout)
- Ceiling Deck
- 1'x1' Ceiling Tiles, Textured
- 1'x1' Ceiling Tiles, Textured Mastic
- Terrazzo Flooring
- Interior Brick Mortar
- Exterior Window Frame Caulking, Gray
- Exterior Brick Mortar
- 2'x4' Ceiling Tiles, Patterned/Pinhole
- 1'x1' Ceiling Tiles, Pinhole
- 1'x1' Ceiling Tiles, Pinhole Mastic

- Interior Window Frame Caulk, Gray
- Interior Window Frame Caulk, Beige
- Exterior Stone Window Sill Caulk, Gray
- Exterior Brick Mortar, (Newer)
- Pipe Joint to Fiberglass Pipe Insulation
- Pipe Gasket
- 1'x1' Ceiling Tiles, Pinhole
- 1'x1' Ceiling Tiles, Pinhole Mastic
- 1'x1' Ceiling Tiles, Spline
- Cinderblock Mortar, Gray
- Caulking to Exterior Stone Window Detailing
- Putty to Exterior Main Entry Door Windows
- Exterior Door Frame Caulk, Tan
- Exterior Garage Door Frame Caulk, Gray
- Exterior Window Frame Caulk, Off-White
- Exterior Door Frame Caulk, Cream
- Exterior Window Frame Caulk, Tan
- Exterior Louver Caulk, Gray
- Roof Fabric (Stage Roof)
- Roof Tar (Stage Roof)
- Roof Decking (Stage Roof)

4.0 INSPECTION RESULTS

A. ASBESTOS-CONTAINING MATERIAL

The asbestos inspection involved a thorough visual examination of all areas that may be impacted during the upcoming Roof Replacement Project at the Rochambeau School. The following suspect materials were sampled and analyzed for asbestos content by Berger:

4.1 Table 4.1 – Suspect Materials Inspected

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
Samples collected during Berger's latest inspection on 03/15/18			
01	Roofs A-C & E-L	Concrete, Gray (Bot.)	NAD
02	Roofs A-C & E-L	Vapor Barrier Tar, Black	NAD
03	Roofs A-L	Laid Scrim, Black	NAD
04	Roofs B-D & J	Sealant to Skylight	NAD
05	Roofs B-C & J	Skylight Flashing, Black	NAD
06	Roofs A-C, E & G-L	Perimeter Flashing, Black	1.60% Chrysotile
07	Roofs A-C & E-L	Exhaust Flashing, Black	<1.00% Chrysotile
08	Roofs A-C & E-L	Coping Stone Mortar, Gray/Brown	NAD
09	Roofs A-L	Brick Mortar, Gray	NAD
10	Roofs A	Chimney Mortar, Gray	NAD

HOMOGENOUS MATERIAL	LOCATION	MATERIAL	ASBESTOS CONTENT
11	Roofs A-C & E-L	Parapet Brick Mortar, Gray/Brown	NAD
12	Roofs C	Tar on Conduit & Flash, Black	NAD
13	Roofs E	Caulking on Exhaust, Beige	NAD
14	Roofs A, C, E, K & I	Window Frame Caulking, Beige	NAD
15	Roofs A, C, E, K & I	Coating above Windows, Beige	NAD
16	Roofs A-C & E-L	Caulking on Cap, Gray	NAD
17	Roofs A-C & E-L	Tar on Cap, Black	NAD
18	Roofs A-C, E & G-L	Coping Stone Caulking, Gray	1.3% Chrysotile
19	Roofs I	Pitch Pocket Tar, Black	NAD
20	Sloped Roof	Roof Shingles & Felt Paper, Black	NAD
21	Roofs F	Felt to Foam Insulation, Black	NAD
22	Roofs F	Caulking to Cap Flash, Gray	NAD
23	Roof D	Skylight Flashing, Black	NAD
24	Roof D	Caulking on Cap & Skylight, Beige	NAD
25	Roof D	Screed, Gray (Bot.)	NAD
26	Roof D	Tar on Foam Insulation, Black	NAD
27	Roof D	Perlite Insulation, Brown	NAD
28	Roof D	Roof Membrane, Black	NAD
29	Exterior Facade	Exterior Expansion Joint Caulking, Gray	<1.00% Chrysotile

Bold = Positive for ACM **NAD = No Asbestos Detected**

4.2 CONDITION AND FRIABILITY ASSESSMENT TABLE

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

Table 4.2 – Condition and Friability Assessment

Location	Material	Quantity	Friability	Condition
Roofs A-C, E & G-L	Perimeter Flashing, Black	2,850 SF	Non-Friable	Good
Roofs A-C, E & G-L	Coping Stone Caulking, Gray	900 LF (75 SF)	Non-Friable	Good

Condition Definitions:

Good: None/Minimal apparent damage to ACM

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

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

4.3 SAMPLE ANALYSIS TABLE

Laboratory analysis results, in tabular form, are included in Appendix A.

5.0 AREAS NOT ACCESSIBLE

During the Inspection the following areas were not accessible:

Void Spaces within Walls, Ceilings & Floors: No destructive sampling was performed on concealed spaces in walls, ceilings or floors to access plenum, chases etc. It should be assumed that asbestos containing materials may exist in these spaces. Any suspect materials encountered during work should be sampled for analysis before work continues.

Building Envelope: No destructive sampling was performed on the building envelope. It should be assumed that asbestos containing materials may exist in these spaces. Any suspect materials encountered during work should be sampled for analysis before work continues.

6.0 CONCLUSIONS AND RECOMMENDATIONS

ACM materials have been identified at the Rochambeau School which will be impacted as part of the upcoming Roof Replacement Project at the Rochambeau School. If at any point the current scope of work changes, ACM materials reported in Section 3.0 of this report, may require complete removal prior to the start of the Roof Replacement Project.

The ACM inspection was conducted at the request of White Plains Public School District for the upcoming Roof Replacement Project at the Rochambeau School. Any change in the scope of work will require further investigation to accurately classify any additional ACM resulting from the modified or updated scope of work.

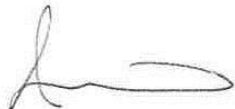
7.0 REPORT CERTIFICATIONS

This report, and the supporting data, findings, conclusions, opinions, and recommendations it contains represent the result of LB's efforts for the environmental inspection work for the upcoming Roof Replacement Project at the Rochambeau School.

Opinions and recommendations presented in this report apply to site conditions and features as they existed at the time of LB's site visits, and those reasonably foreseeable. They cannot necessarily apply to conditions and features of which LB is unaware and has not had the opportunity to evaluate.

The conclusions presented in this report are professional opinions solely upon LB's visual observations of accessible areas, laboratory test data, and current regulatory requirements. These conclusions are intended exclusively for the purpose stated herein and the site indicated for the project indicated.

Prepared by:



Marvin Luccioni
NYS DOL Inspector

Reviewed by:



Craig Napolitano, CHMM
Vice President, Industrial
Hygiene & Hazmat Services



**APPENDIX A:
ASBESTOS SAMPLE ANALYSIS RESULTS IN TABULAR FORM**



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APPENDIX A SAMPLE ANALYSIS RESULTS IN TABULAR FORM ROCHAMBEAU SCHOOL 228 FISHER AVE. WHITE PALINS, NY 10606

Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
1	01	Roof A	Concrete, Gray (Bot.)	NAD	N/A
1	02	Roof K	Concrete, Gray (Bot.)	NAD	N/A
2	03	Roof A	Vapor Barrier Tar, Black	NAD	NAD
2	04	Roof K	Vapor Barrier Tar, Black	NAD	NAD
3	05	Roof A	Laid Scrim, Black	NAD	NAD
3	06	Roof K	Laid Scrim, Black	NAD	NAD
4	07	Rood C	Sealant to Skylight	NAD	NAD
4	08	Roof B	Sealant to Skylight	NAD	NAD
5	09	Roof B	Skylight Flashing, Black	<1.00% Chrysotile	<1.00% Chrysotile
5	10	Roof B	Skylight Flashing, Black	<1.00% Chrysotile	<1.00% Chrysotile
6	11	Roof E	Perimeter Flashing, Black	<1.00% Chrysotile	NA/PS
6	12	Roof K	Perimeter Flashing, Black	1.60% Chrysotile	NA/PS
7	13	Roof A	Exhaust Flashing, Black	NAD	<1.00% Chrysotile
7	14	Roof K	Exhaust Flashing, Black	NAD	<1.00% Chrysotile
8	15	Roof C	Coping Stone Mortar, Gray/Brown	NAD	NAD
8	16	Roof K	Coping Stone Mortar, Gray/Brown	NAD	NAD
9	17	Roof C	Brick Mortar, Gray	NAD	N/A
9	18	Roof K	Brick Mortar, Gray	NAD	N/A

Bold = Positive for ACM
NAD = No Asbestos Detected

N/A = Not Applicable
NA/PS = Not analyzed/ positive sample



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Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
10	19	Roof A	Chimney Mortar, Gray	NAD	N/A
10	20	Roof A	Chimney Mortar, Gray	NAD	N/A
11	21	Roof C	Parapet Brick Mortar, Gray/Brown	NAD	N/A
11	22	Roof C	Parapet Brick Mortar, Gray/Brown	NAD	N/A
12	23	Roof C	Tar on Conduit & Flash, Black	NAD	NAD
12	24	Roof C	Tar on Conduit & Flash, Black	NAD	NAD
13	25	Roof E	Caulking on Exhaust, Beige	NAD	NAD
13	26	Roof E	Caulking on Exhaust, Beige	NAD	NAD
14	27	Roof C	Window Frame Caulking, Beige	NAD	NAD
14	28	Roof A	Window Frame Caulking, Beige	NAD	NAD
15	29	Roof C	Coating above Windows, Beige	NAD	NAD
15	30	Roof A	Coating above Windows, Beige	NAD	NAD
16	31	Roof B	Caulking on Cap, Gray	NAD	NAD
16	32	Roof B	Caulking on Cap, Gray	NAD	NAD
17	33	Roof K	Tar on Cap, Black	NAD	NAD
17	34	Roof E	Tar on Cap, Black	NAD	NAD
18	35	Roof C	Coping Stone Caulking, Gray	<1.00% Anthophyllite	1.3% Chrysotile
18	36	Roof A	Coping Stone Caulking, Gray	<1.00% Anthophyllite <1.00% Chrysotile	NA/PS
19	37	Roof I	Pitch Pocket Tar, Black	NAD	NAD
19	38	Roof I	Pitch Pocket Tar, Black	NAD	NAD
20	39	Sloped Roof	Roof Shingles & Felt Paper, Black	NAD	NAD
20	40	Sloped Roof	Roof Shingles & Felt Paper, Black	NAD	NAD
21	41	Roof F	Felt to Foam Insulation, Black	NAD	NAD
21	42	Roof F	Felt to Foam Insulation, Black	NAD	NAD

Bold = Positive for ACM
NAD = No Asbestos Detected

N/A = Not Applicable
NA/PS = Not analyzed/ positive sample



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Homogeneous Area No.	Sample No.	Location	Material	PLM Result	TEM Result
22	43	Roof F	Caulking to Cap Flash, Gray	NAD	NAD
22	44	Roof F	Caulking to Cap Flash, Gray	NAD	NAD
23	45	Roof D	Skylight Flashing, Black	NAD	NAD
23	46	Roof D	Skylight Flashing, Black	NAD	NAD
24	47	Roof D	Caulking on Cap & Skylight, Beige	NAD	NAD
24	48	Roof D	Caulking on Cap & Skylight, Beige	NAD	NAD
25	49	Roof D	Screed, Gray (Bot.)	NAD	N/A
25	50	Roof D	Screed, Gray (Bot.)	NAD	N/A
26	51	Roof D	Tar on Foam Insulation, Black	NAD	NAD
26	52	Roof D	Tar on Foam Insulation, Black	NAD	NAD
27	53	Roof D	Perlite Insulation, Brown	NAD	N/A
27	54	Roof D	Perlite Insulation, Brown	NAD	N/A
28	55	Roof D	Roof Membrane, Black	NAD	NAD
28	56	Roof D	Roof Membrane, Black	NAD	NAD
29	57	Exterior Facade	Exterior Expansion Joint Caulking, Gray	<1.00% Chrysotile	NAD
29	58	Exterior Facade	Exterior Expansion Joint Caulking, Gray	NAD	NAD

Bold = Positive for ACM
 NAD = No Asbestos Detected

N/A = Not Applicable
 NA/PS = Not analyzed/ positive sample



**APPENDIX B:
ASBESTOS BULK SAMPLE FIELD DATA SHEETS
WITH CHAIN OF CUSTODY
AND LABORATORY RESULTS**



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EMSL Order: 061804853

Customer ID: LBAP78

Customer PO: 2042261.035

Project ID:

Attention: Marvin Luccioni
Louis Berger U.S., Inc
96 Morton Street
8th floor
New York, NY 10014

Phone: (718) 730-2741

Fax:

Received Date: 03/17/2018 11:02 AM

Analysis Date: 03/19/2018 - 03/22/2018

Collected Date: 03/15/2018

Project: W.P.S.D., Rocham Beau School, 228 Fisher Ave., W.P., NY, Roofs A-L, Project #:2042261.035

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 1-1 061804853-0001		Description Homogeneity	Roof A - Concrete, Gray (Bot.) Homogeneous		
PLM NYS 198.1 Friable	03/19/2018	Gray		15.00% Ca Carbonate 15.00% Non-fibrous (other) 70.00% 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 1-2 061804853-0002		Description Homogeneity	Roof K - Concrete, Gray (Bot.) Homogeneous		
PLM NYS 198.1 Friable	03/21/2018	Gray		10.00% Ca Carbonate 40.00% Non-fibrous (other) 50.00% 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 2-3 061804853-0003		Description Homogeneity	Roof A - Vapor Barrier Tar, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 2-4 061804853-0004		Description Homogeneity	Roof K - Vapor Barrier Tar, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 3-5 061804853-0005		Description Homogeneity	Roof A - Laid Scrim, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray/ Black		100.00% Other	None Detected

Initial Report From: 03/22/2018 12:50:55



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EMSL Order: 061804853
 Customer ID: LBAP78
 Customer PO: 2042261.035
 Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 3-6 061804853-0006		Description Roof K - Laid Scrim, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray/ Black		100.00% Other	None Detected
Sample ID 4-7 061804853-0007		Description Roof C - Sealant to Skylight Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 4-8 061804853-0008		Description Roof B - Sealant to Skylight Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 5-9 061804853-0009		Description Roof B - Skylight Flashing, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black	None	100.00% Other	Inconclusive : <1.00% Chrysotile
TEM NYS 198.4 NOB	03/22/2018	Black	None	100.00% Other	<1.00% Chrysotile
Sample ID 5-10 061804853-0010		Description Roof B - Skylight Flashing, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black	None	100.00% Other	Inconclusive : <1.00% Chrysotile
TEM NYS 198.4 NOB	03/22/2018	Black	None	100.00% Other	<1.00% Chrysotile
Sample ID 6-11 061804853-0011		Description Roof E - Perimeter Flashing, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black	None	100.00% Other	Inconclusive : <1.00% Chrysotile
TEM NYS 198.4 NOB	03/22/2018				Not Analyzed

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EMSL Order: 061804853
Customer ID: LBAP78
Customer PO: 2042261.035
Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 6-12 061804853-0012		Description Homogeneity	Roof K - Perimeter Flashing, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black	None	98.40% Other	1.60% Chrysotile
TEM NYS 198.4 NOB	03/22/2018				Not Analyzed
Sample ID 7-13 061804853-0013		Description Homogeneity	Roof A - Exhaust Flashing, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray/ Black	None	100.00% Other	<1.00% Chrysotile
Sample ID 7-14 061804853-0014		Description Homogeneity	Roof K - Exhaust Flashing, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray/ Black	None	100.00% Other	<1.00% Chrysotile
Sample ID 8-15 061804853-0015		Description Homogeneity	Roof C - Coping Stone Mortar, Gray/Brown Homogeneous		
PLM NYS 198.1 Friable	03/19/2018	Gray		25.00% Ca Carbonate 15.00% Non-fibrous (other) 60.00% 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 8-16 061804853-0016		Description Homogeneity	Roof K - Coping Stone Mortar, Gray/Brown Homogeneous		
PLM NYS 198.1 Friable	03/21/2018	Gray		15.00% Ca Carbonate 25.00% Non-fibrous (other) 60.00% 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 9-17 061804853-0017		Description Homogeneity	Roof C - Brick Mortar, Gray Homogeneous		
PLM NYS 198.1 Friable	03/19/2018	Gray		15.00% Ca Carbonate 15.00% Non-fibrous (other) 70.00% 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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EMSL Order: 061804853

Customer ID: LBAP78

Customer PO: 2042261.035

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 9-18 061804853-0018		Description Homogeneity	Roof K - Brick Mortar, Gray Homogeneous		
PLM NYS 198.1 Friable	03/21/2018	Gray		10.00% Ca Carbonate 15.00% Non-fibrous (other) 75.00% 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 10-19 061804853-0019		Description Homogeneity	Roof A - Chimney Mortar, Gray/Brown Homogeneous		
PLM NYS 198.1 Friable	03/19/2018	Gray		20.00% Ca Carbonate 2.00% Mica 10.00% Non-fibrous (other) 68.00% 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 10-20 061804853-0020		Description Homogeneity	Roof A - Chimney Mortar, Gray/Brown Homogeneous		
PLM NYS 198.1 Friable	03/19/2018	Gray		22.00% Ca Carbonate 3.00% Mica 20.00% Non-fibrous (other) 55.00% 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 11-21 061804853-0021		Description Homogeneity	Roof C - Parapet Brick Mortar, Gray/Brown Homogeneous		
PLM NYS 198.1 Friable	03/19/2018	Gray/ Tan		18.00% Ca Carbonate 3.00% Mica 12.00% Non-fibrous (other) 67.00% 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 11-22 061804853-0022		Description Homogeneity	Roof C - Parapet Brick Mortar, Gray/Brown Homogeneous		
PLM NYS 198.1 Friable	03/21/2018	Gray		10.00% Ca Carbonate 15.00% Non-fibrous (other) 75.00% 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: 03/22/2018 12:50:55



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<http://www.EMSL.com> / carleplacelab@emsl.com

EMSL Order: 061804853
 Customer ID: LBAP78
 Customer PO: 2042261.035
 Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 12-23 061804853-0023		Description Homogeneity	Roof C - Tar on Conduit and Flash, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 12-24 061804853-0024		Description Homogeneity	Roof C - Tar on Conduit and Flash, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 13-25 061804853-0025		Description Homogeneity	Roof E - Caulking on Exhaust, Beige Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Beige		100.00% Other	None Detected
Sample ID 13-26 061804853-0026		Description Homogeneity	Roof E - Caulking on Exhaust, Beige Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Beige		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Beige		100.00% Other	None Detected
Sample ID 14-27 061804853-0027		Description Homogeneity	Roof C - Window Frame Caulking, Beige Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray		100.00% Other	None Detected
Sample ID 14-28 061804853-0028		Description Homogeneity	Roof A - Window Frame Caulking, Beige Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray		100.00% Other	None Detected

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EMSL Order: 061804853

Customer ID: LBAP78

Customer PO: 2042261.035

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 15-29 061804853-0029		Description Homogeneity	Roof C - Coating Above Windows, Beige Heterogeneous		
PLM NYS 198.1 Friable	03/19/2018	Gray/ Tan/ Green		15.00% Ca Carbonate 30.00% Non-fibrous (other) 55.00% 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 15-30 061804853-0030		Description Homogeneity	Roof A - Coating Above Windows, Beige Homogeneous		
PLM NYS 198.1 Friable	03/21/2018	Gray		10.00% Ca Carbonate 15.00% Non-fibrous (other) 75.00% 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 16-31 061804853-0031		Description Homogeneity	Roof B - Caulking on Cap, Gray Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray		100.00% Other	None Detected
Sample ID 16-32 061804853-0032		Description Homogeneity	Roof B - Caulking on Cap, Gray Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray		100.00% Other	None Detected
Sample ID 17-33 061804853-0033		Description Homogeneity	Roof K - Tar on Cap, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 17-34 061804853-0034		Description Homogeneity	Roof E - Tar on Cap, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected

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EMSL Order: 061804853

Customer ID: LBAP78

Customer PO: 2042261.035

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 18-35 061804853-0035		Description Homogeneity	Roof C - Coping Stone Caulking, Gray Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray	None	100.00% Other	Inconclusive : <1.00% Anthophyllite
TEM NYS 198.4 NOB	03/22/2018	Gray	None	98.70% Other	<1.00% Anthophyllite <1.00% Chrysotile 1.3% Total
Sample ID 18-36 061804853-0036		Description Homogeneity	Roof A - Coping Stone Caulking, Gray Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray	None	100.00% Other	<1.00% Anthophyllite <1.00% Chrysotile Inconclusive : <1% Total
TEM NYS 198.4 NOB	03/22/2018				Positive Stop (Not Analyzed)
Sample ID 19-37 061804853-0037		Description Homogeneity	Roof I - Picth Pocket Tar, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 19-38 061804853-0038		Description Homogeneity	Roof I - Picth Pocket Tar, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 20-39 061804853-0039		Description Homogeneity	Roof, Sloped - Roof Shingles and Felt Paper, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray/ Black		100.00% Other	None Detected
Sample ID 20-40 061804853-0040		Description Homogeneity	Roof, Sloped - Roof Shingles and Felt Paper, Black Homogeneous		
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray/ Black		100.00% Other	None Detected

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EMSL Order: 061804853

Customer ID: LBAP78

Customer PO: 2042261.035

Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 21-41 061804853-0041		Description Roof F - Felt to Foam Insulation, Black Homogeneity Heterogeneous			
PLM NYS 198.1 Friable	03/19/2018	White/ Black	51.00% Cellulose 4.00% Glass	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 21-42 061804853-0042		Description Roof F - Felt to Foam Insulation, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable	03/21/2018	White/ Black	80.00% Cellulose	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 22-43 061804853-0043		Description Roof F - Caulking to Cap Flash, Gray Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	White		100.00% Other	None Detected
Sample ID 22-44 061804853-0044		Description Roof F - Caulking to Cap Flash, Gray Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	White		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	White		100.00% Other	None Detected
Sample ID 23-45 061804853-0045		Description Roof D - Skylight Flashing, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 23-46 061804853-0046		Description Roof D - Skylight Flashing, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray/ Black		100.00% Other	None Detected

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EMSL Order: 061804853
Customer ID: LBAP78
Customer PO: 2042261.035
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 24-47 061804853-0047		Description Roof D - Caulking on Cap and Skylight, Beige Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray		100.00% Other	None Detected
Sample ID 24-48 061804853-0048		Description Roof D - Caulking on Cap and Skylight, Beige Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray		100.00% Other	None Detected
Sample ID 25-49 061804853-0049		Description Roof D - Screed, Gray (Bot.) Homogeneity Heterogeneous			
PLM NYS 198.1 Friable	03/19/2018	Tan/ White	3.00% Cellulose	22.00% Ca Carbonate 65.00% Gypsum 10.00% 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 25-50 061804853-0050		Description Roof D - Screed, Gray (Bot.) Homogeneity Heterogeneous			
PLM NYS 198.1 Friable	03/19/2018	Tan/ White	2.00% Cellulose	33.00% Ca Carbonate 60.00% 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 26-51 061804853-0051		Description Roof D - Tar to Foam Insulation, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black/ Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black/ Yellow		100.00% Other	None Detected
Sample ID 26-52 061804853-0052		Description Roof D - Tar to Foam Insulation, Black Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black/ Yellow		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black/ Yellow		100.00% Other	None Detected

Initial Report From: 03/22/2018 12:50:55



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EMSL Order: 061804853

Customer ID: LBAP78

Customer PO: 2042261.035

Project ID:

Test Report: Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos		Asbestos
			Fibrous	Non-Fibrous	
Sample ID 27-53 061804853-0053		Description Roof D - Perlite Insulation, Brown			
		Homogeneity Homogeneous			
PLM NYS 198.1 Friable	03/19/2018	Tan	65.00% Cellulose	5.00% Non-fibrous (other) 30.00% Perlite	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 27-54 061804853-0054		Description Roof D - Perlite Insulation, Brown			
		Homogeneity Homogeneous			
PLM NYS 198.1 Friable	03/21/2018	Gray	40.00% Cellulose	10.00% Non-fibrous (other) 50.00% Perlite	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 28-55 061804853-0055		Description Roof D - Roof Membrane, Black			
		Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Brown/ Gray/ Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Brown/ Gray/ Black		100.00% Other	None Detected
Sample ID 28-56 061804853-0056		Description Roof D - Roof Membrane, Black			
		Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Black		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Black		100.00% Other	None Detected
Sample ID 29-57 061804853-0057		Description Roof, Exterior Façade - Expansion Joint Caulking, Gray			
		Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray	None	100.00% Other	<1.00% Chrysotile
Sample ID 29-58 061804853-0058		Description Roof, Exterior Façade - Expansion Joint Caulking, Gray			
		Homogeneity Homogeneous			
PLM NYS 198.1 Friable					Not Analyzed
PLM NYS 198.6 VCM					Not Analyzed
PLM NYS 198.6 NOB	03/21/2018	Gray		100.00% Other	Inconclusive: None Detected
TEM NYS 198.4 NOB	03/22/2018	Gray		100.00% Other	None Detected

Initial Report From: 03/22/2018 12:50:55



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EMSL Order: 061804853

Customer ID: LBAP78

Customer PO: 2042261.035

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: 3/17/2018

Sample Receipt Time: 11:02 AM

Analysis Completed Date: 3/21/2018

Analysis Completed Time: 9:54 AM

Analyst(s):

Daniel Clarke PLM NYS 198.1 Friable (7)

Steve Juszczuk PLM NYS 198.1 Friable (11)

Daniel Clarke PLM NYS 198.6 NOB (40)

Alyssa McDonald TEM NYS 198.4 NOB (37)

Samples reviewed and approved by:

Michelle McGowan, 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. Carle Place, NY NYS ELAP 11469

Initial Report From: 03/22/2018 12:50:55

061804853


OrderID: 061804853

		LOUIS BERGER		<u>(C) ASBESTOS SURVEY DATA SHEET/ CHAIN OF CUSTODY</u>				PAGE <u>1</u> OF <u>5</u>	
LB PROJ <u>2042261.035</u>				LOCATION(S) SURVEYED: <u>Roofs A - 1</u>					
CLIENT: <u>W.P.S.D</u>				PROPOSED PROJECT: <u>ROOF REPLACEMENT</u>					
PROJECT SITE: <u>ROCHAM BEAU SCHOOL @ 228 FISHER AVE, W.P., NY</u>				DATE(S) OF INSPECTION: <u>03/15/18</u>					
Project Manager: _____				Inspector(s) <u>M. Muccioni</u>					
LOUIS BERGER TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341 ADDRESS: 98 Morton Street, 8 Floor, New York, NY 10014				RESULTS TO: _____ <u>MLUCCIONI@LOUISBERGER.COM</u>				TURNAROUND TIME: <input type="checkbox"/> 4 HR. <input type="checkbox"/> 24 HRS. <input type="checkbox"/> 48 HRS. <input checked="" type="checkbox"/> 72 HRS. (KY)	
HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION		APPROX. QUANTITY (LF/SF)	FIELD NOTES			
1	01	CONCRETE, GRAY (BOT.)	Roof A			MULTI-LAYERED ROOF SYSTEM. • BOT. CONCRETE • 3rd VAPOR BARRIER • 2nd PERM INS. • TOP LAID SCRIM			
↓	02	↓	K						
2	03	VAPOR BARRIER TAR, BLACK	A						
↓	04	↓	K			RECEIVED EHS ANALYTICAL INC. MAR 17 11:02 SAMPLE PLACED IN			
3	05	LAID SCRIM, BLACK	A						
↓	06	↓	K						
4	07	SEALANT TO SKYLIGHT	C						
↓	08	↓	B						
5	09	SKYLIGHT FLASHING, BLACK	B						
↓	10	↓	↓						
6	11	PERIMETER FLASHING, BLACK	E						
↓	12	↓	K						
CHAIN OF CUSTODY									
Relinquished by: (print) <u>M. Muccioni</u>	(Sign) <u>[Signature]</u>	<u>03/18/18</u>	AMPM	Relinquished by: (print)	(Sign)	<u>1 1</u>	AMPM	Relinquished by: (print)	(Sign)
Received by: (print) <u>Katherine Viard</u>	(Sign) <u>[Signature]</u>	<u>3/17/18</u>	AMPM	Received by: (print)	(Sign)	<u>1 1</u>	AMPM	Received by: (print)	(Sign)

GENERAL NOTES: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

06180 4853

OrderID: 061804853

 LOUIS BERGER		ASBESTOS SURVEY DATA SHEET/ CHAIN OF CUSTODY				PAGE <u>2</u> OF <u>5</u>	
LB PROJ <u>2042261.035</u> CLIENT: <u>W.P.S.D</u>		LOCATION(S) SURVEYED: <u>Roofs A - L</u> PROPOSED PROJECT: <u>ROOF REPLACEMENT</u> DATE(S) OF INSPECTION: <u>03/15/18</u> Inspector(s) <u>M. Muccioni</u>					
PROJECT SITE: <u>ROCHAM BEAU SCHOOL @ 228 FISHER AVE., W.P., NY</u> Project Manager: _____		LOUIS BERGER TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341 ADDRESS: 98 Morton Street, 8 Floor, New York, NY 10014		RESULTS TO: _____ <u>MLUCCIONI@LOUISBERGER.COM</u>		TURNAROUND TIME: <input type="checkbox"/> 4 HR. <input type="checkbox"/> 24 HRS. <input type="checkbox"/> 48 HRS. <input checked="" type="checkbox"/> 72 HRS.	
HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES		
7	13	EXHAUST FLASHING, BLACK	Roof A				
↓	14	↓	1K				
8	15	COPING STONE MORTAR, GRAY/BROWN	C				
↓	16	↓	K				
9	17	BRICK MORTAR, GRAY	C				
↓	18	↓	K				
10	19	CHIMNEY MORTAR, GRAY/BROWN	A				
↓	20	↓	↓				
11	21	PARAPET BRICK MORTAR, GRAY/BROWN	C				
↓	22	↓	↓				
12	23	TIE ON CONDUIT & FLASH, BLACK	C				
↓	24	↓	↓				

RECEIVED
 EHS ANALYTICAL INC.
 CARLE PLACE, NY
 2018 MAR 17 A 11:02

CHAIN OF CUSTODY									
Relinquished by: (print) <u>M. Muccioni</u>	(Sign) <u>[Signature]</u>	<u>03/15/18</u>	AMPM	Relinquished by: (print) _____	(Sign) _____	____	AMPM	Relinquished by: (print) _____	(Sign) _____
Received by: (print) <u>Katherine Vraza</u>	(Sign) <u>[Signature]</u>	<u>3/17/18</u>	1102 AMPM	Received by: (print) _____	(Sign) _____	____	AMPM	Received by: (print) _____	(Sign) _____

3/19/18 037m
[Signature]

3/21/18
[Signature]

3/22/18
Alexis McDonald

GENERAL NOTES: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

061804853

Order ID: 061804853



LOUIS BERGER

ASBESTOS SURVEY DATA SHEET/ CHAIN OF CUSTODY

PAGE 3 OF 5

LB PROJ 2042261.035

CLIENT: W.P.S.D

LOCATION(S) SURVEYED: Roofs A - L

PROPOSED PROJECT: ROOF REPLACEMENT

DATE(S) OF INSPECTION: 03/15/18

Inspector(s) M. Muccioni

PROJECT SITE: ROCHAM BEAN SCHOOL @ 228 FISHER AVE., W.P., NY

Project Manager:

LOUIS BERGER

TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341

ADDRESS: 98 Morton Street, 8 Floor, New York, NY 10014

RESULTS TO:

MLUCCIONI@LOUISBERGER.COM

TURNAROUND TIME:

☐ 4 HR. ☐ 24 HRS. ☐ 48 HRS. ☒ 72 HRS.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
13	25	CAULKING OF EXHAUST, BEIGE	ROOF E		
↓	26	↓	↓		
14	27	WINDOW FRAME CAULKING, BEIGE	C		
↓	28	↓	A		
15	29	COATING ABOVE WINDOWS, BEIGE	C		
↓	30	↓	A		
16	31	CAULKING OF CAP, GRAY	B		
↓	32	↓	↓		
17	33	TAR ON CAP, BLACK	K		
↓	34	↓	E		
18	35	COPING STONE CAULKING, GRAY	C		
↓	36	↓	A		

RECEIVED
EHS ANALYTICAL, INC.
CARLE PLACE, NY
2018 MAR 17 A 11:02

CHAIN OF CUSTODY

Relinquished by: (print) M. Muccioni	(Sign) <i>M. Muccioni</i>	03/18/18	AM/PM	Relinquished by: (print)	(Sign)	/ /	AM/PM	Relinquished by: (print)	(Sign)	/ /	AM/PM
Received by: (print) Katherine Viava	(Sign) <i>K. Viava</i>	3/17/18	11:02 AM	Received by: (print)	(Sign)	/ /	AM/PM	Received by: (print)	(Sign)	/ /	AM/PM

GENERAL NOTES: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

061804853

OrderID: 061804853



LOUIS BERGER



ASBESTOS SURVEY DATA SHEET/ CHAIN OF CUSTODY

PAGE 4 OF 5

LB PROJ 2042261.035

CLIENT: W.P.S.D

LOCATION(S) SURVEYED: ROOFS A - L

PROPOSED PROJECT: ROOF REPLACEMENT

DATE(S) OF INSPECTION: 03/15/18

Inspector(s) M. LUCCIONI

PROJECT SITE: ROCHAM BEAU SCHOOL @ 228 FISHER AVE., W.P., NY

Project Manager:

LOUIS BERGER

TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341

ADDRESS: 98 Morton Street, 8 Floor, New York, NY 10014

RESULTS TO:

MLUCCIONI@LOUISBERGER.COM

TURNAROUND TIME:

☐ 4 HR. ☐ 24 HRS. ☐ 48 HRS. ☒ 72 HRS.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
19	37	8 IN ROCKET TAR, BLACK	Roof I		
↓	38	↓	↓		
20	39	Roof SHINGLES & FELT PAPER, BLACK	SL OPER		
↓	40	↓	↓		
21	41	FELT TO FOAM INSULATION, BLACK	F		
↓	42	↓	↓		
22	43	CAULKING TO CAP FLASH, GRAY	↓		
↓	44	↓	↓		
23	45	SKYLIGHT FLASHING, BLACK	D		
↓	46	↓	↓		
24	47	CAULKING ON CAP & SKYLIGHT, BEIGE	↓		
↓	48	↓	↓		

RECEIVED
EHS ANALYTICAL, INC.
CARLE PLACE, NY
2018 MAR 17 A 11:02

CHAIN OF CUSTODY

Relinquished by: (print) M. LUCCIONI	(Sign)	03/18/18	AMPM	Relinquished by: (print)	(Sign)	11	AMPM	Relinquished by: (print)	(Sign)	11	AMPM
Received by: (print) Katherine Viad	(Sign)	3/17/18	1012 AMPM	Received by: (print)	(Sign)	11	AMPM	Received by: (print)	(Sign)	11	AMPM

3/16/18 837R

3/21/18

Alyson McDonald 3/22/18

GENERAL NOTES: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

061804853

Order ID: 061804853



LOUIS BERGER

ASBESTOS SURVEY DATA SHEET/ CHAIN OF CUSTODYPAGE 5 OF 5LB PROJ 2042261.035CLIENT: W.P.S.DLOCATION(S) SURVEYED: Roofs A - LPROPOSED PROJECT: ROOF REPLACEMENTDATE(S) OF INSPECTION: 03/15/18Inspector(s) M. MuccioniPROJECT SITE: ROCHAM BEAU SCHOOL @ 228 FISHER AVE., W.P., NY

Project Manager: _____

LOUIS BERGER

TELEPHONE NO.: (212) 612-7900 FAX NO.: (212) 363-4341

ADDRESS: 98 Morton Street, 8 Floor, New York, NY 10014

RESULTS TO: _____

MLUCCIONI@LOUISBERGER.COM

TURNAROUND TIME:

☐ 4 HR. ☐ 24 HRS. ☐ 48 HRS. ☒ 72 HRS.

HA	SAMPLE NO.	MATERIAL DESCRIPTION	SAMPLE LOCATION	APPROX. QUANTITY (LF/SF)	FIELD NOTES
25	49	SCREENED, GRAY (BOT)	Roof D		
↓	50	↓			
26	51	TAR TO FOAM INSULATION, BLACK			
↓	52	↓			
27	53	PERLITE INSULATION, BROWN			
↓	54	↓			
28	55	ROOF MEMBRANE, BLACK			
↓	56	↓			
29	57	EXPANSION JOINT CAULKING, GRAY	EXTERIOR FACADE		
↓	58	↓	↓		

RECEIVED
EMSL ANALYTICAL, INC.
CARLE PLACE, NY
2018 MAR 17 A 11:02

CHAIN OF CUSTODY

Relinquished by: (print) <u>M. Muccioni</u>	(Sign) <u>ML</u>	<u>03/18/18</u>	AMPM	Relinquished by: (print) _____	(Sign) _____	_____	AMPM	Relinquished by: (print) _____	(Sign) _____	_____	AMPM
Received by: (print) <u>Katherine Virod</u>	(Sign) <u>KV</u>	<u>3/17/18</u>	AMPM	Received by: (print) _____	(Sign) _____	_____	AMPM	Received by: (print) _____	(Sign) _____	_____	AMPM

GENERAL NOTES: All inconclusive NOBs to be analyzed by TEM. Please stop at 1st positive in any homogeneous group.

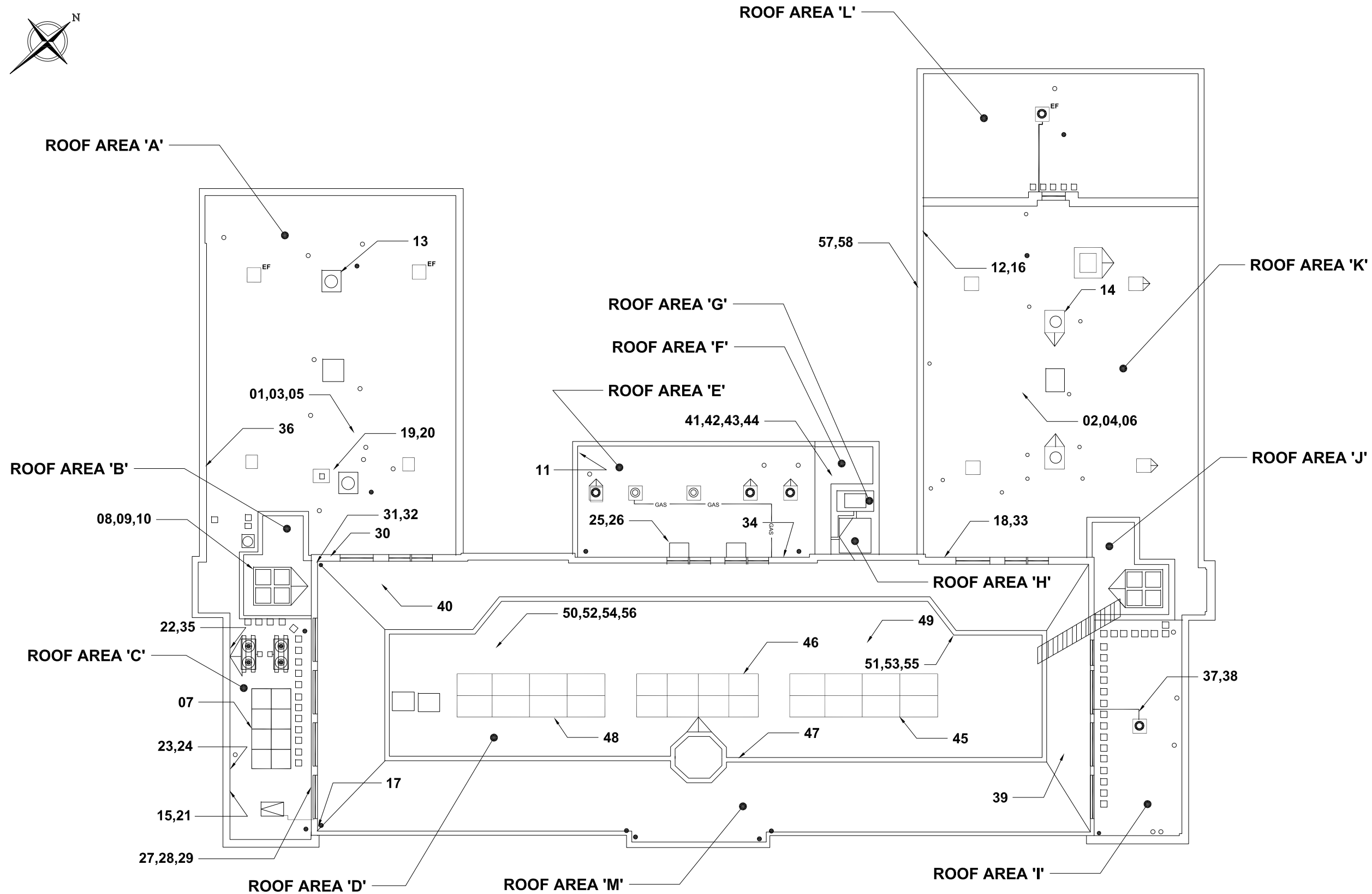
(K)

3/19/18 837 3/24/18 ayman m. m. 3/22/18

Page 5 of 5

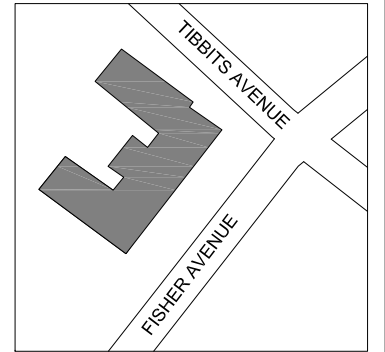


**APPENDIX C:
ASBESTOS BULK SAMPLE LOCATION DRAWINGS**



1 ROOF PLAN
BSL001 SCALE: NOT TO SCALE

LOCATION PLAN



Louis Berger

96 Morton Street, 8th Floor, New York, New York 10014
TEL: 212.612.7900 FAX 212.363.4341 WWW.louisberger.com



REVISIONS:

NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

**WHITE PLAINS CITY
SCHOOL DISTRICT**

**ROOF REPLACEMENT AT
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606**

DRAWING TITLE:

**BULK SAMPLE LOCATIONS
ROOF PLAN**

DRAWN BY:	J. PEREZ	SCALE:	NOT TO SCALE
INSP./INV.:	M. LUCCIONI	DATE:	03/22/2018
CERTIFICATE NO.:	03-11021	DRAWING NUMBER:	
CHECKED BY:	C. NAPOLITANO		

BSL001

DRAWING NUMBER:
1 OF 1



**APPENDIX D:
ASBESTOS CONTAINING MATERIALS LOCATION
DRAWINGS**



ROOF AREA 'L'

LEGEND:

LOCATION OF ASBESTOS CONTAINING FLASHING, BLACK & COPING

STONE CAULKING, GRAY

ROOF AREA 'A'

ROOF AREA 'K'

ROOF AREA 'G'

ROOF AREA 'F'

ROOF AREA 'E'

ROOF AREA 'J'

ROOF AREA 'B'

ROOF AREA 'H'

ROOF AREA 'C'

ROOF AREA 'D'

ROOF AREA 'M'

ROOF AREA 'I'

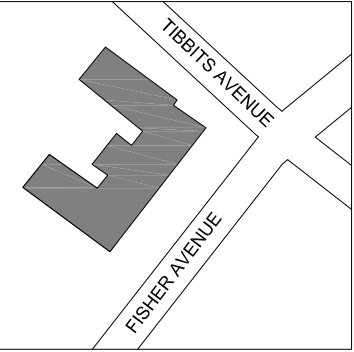
1

ROOF PLAN

ACM001

SCALE: NOT TO SCALE

LOCATION PLAN



Louis Berger

96 Morton Street, 8th Floor, New York, New York 10014
TEL: 212.612.7900 FAX 212.363.4341 WWW.louisberger.com



REVISIONS:

NUMBER	DESCRIPTION	DATE
1		
2		
3		
4		

WHITE PLAINS CITY
SCHOOL DISTRICT

ROOF REPLACEMENT AT
ROCHAMBEAU SCHOOL
228 FISHER AVENUE
WHITE PLAINS, NY 10606

DRAWING TITLE:

ASBESTOS CONTAINING MATERIALS
ROOF PLAN

DRAWN BY:	J. PEREZ	SCALE:	NOT TO SCALE
INSP./INV.:	M. LUCCIONI	DATE:	03/22/2018
CERTIFICATE NO.:	03-11021	DRAWING NUMBER:	
CHECKED BY:	C. NAPOLITANO		

ACM001

DRAWING NUMBER:
1 OF 1



**APPENDIX E:
COMPANY LICENSE, PERSONNEL CERTIFICATIONS AND
LABORATORY ACCREDITATIONS**

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

The Louis Berger Group, Inc.
16th Floor
48 Wall Street
New York, NY 10005

FILE NUMBER: 03-0940
LICENSE NUMBER: 29635
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 02/01/2018
EXPIRATION DATE: 02/28/2019

Duly Authorized Representative – Craig Napolitano:

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



MARVIN LUCCIONI

C/O LOUIS BERGER., 48 WALL ST 16TH FL
NEW YORK NY 10005

Enclosed is your new card.

NYS Department of Labor

The Department of Labor is happy to provide this improved card. We welcome your comments:
nysdol@labor.ny.gov or call (518) 457-2735

YOUR NEW CARD





**APPENDIX F:
PHOTOGRAPHIC DOCUMENTATION**

**ASBESTOS INSPECTION SERVICES FOR
ROCHAMBEAU SCHOOL
228 FISHER AVE.
WHITE PLAINS, NY 10606
PHOTODOCUMENTATION LOG**



Photo 1: Coping Stone Caulking, Gray.



Photo 1: Perimeter Flashing, Black.



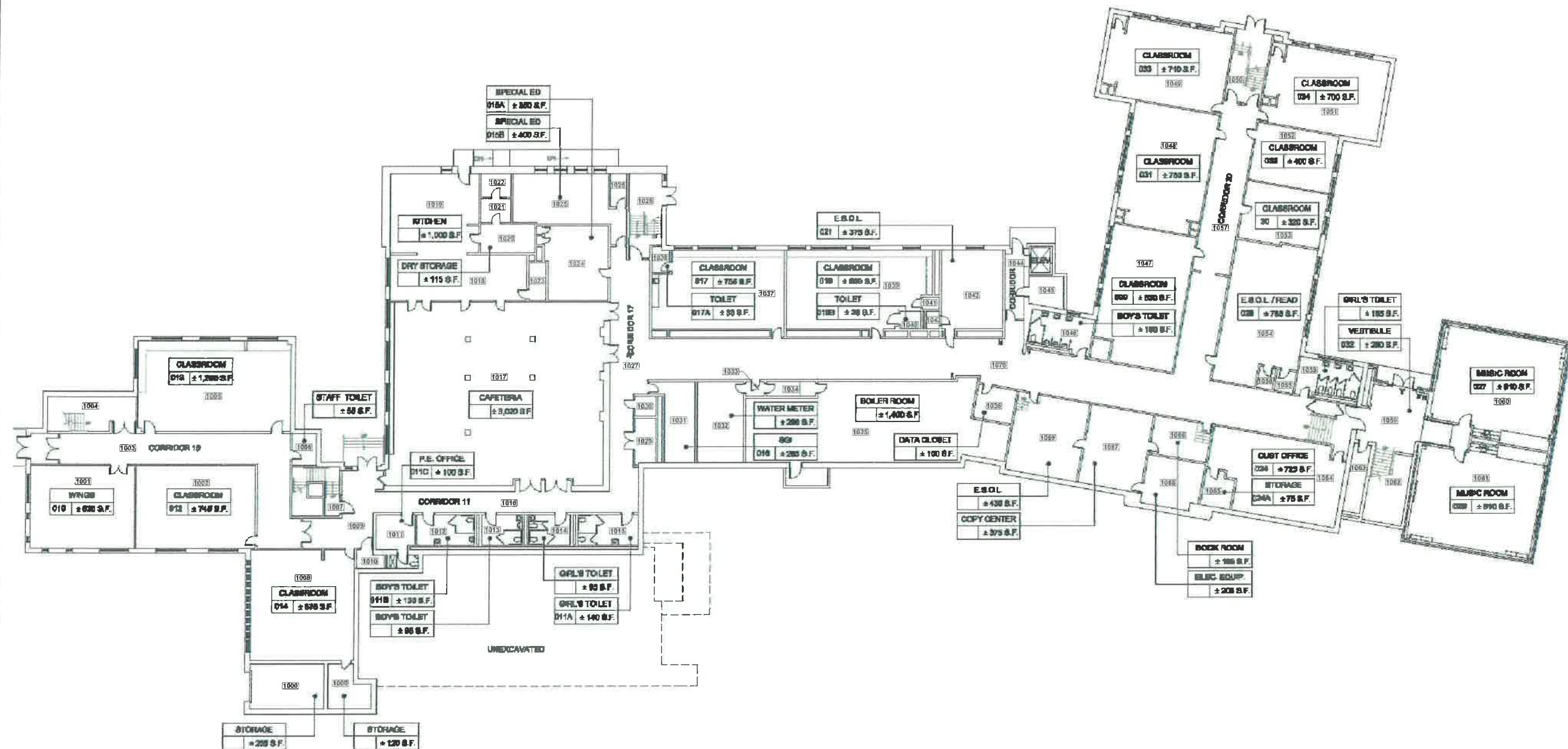
**APPENDIX G:
FILE SEARCH**

AHERA SITE PLAN



Louis Berger & Assoc., PC

565 Taylor Road
Elmsford, NY 10523
TEL 914 758 3710 FAX 212 353 4341 WWW.LOUISBERGER.COM



1 GROUND FLOOR PLAN

SCALE: NTS

SCALE: NTS

KEY PLAN:



SITE PLAN GROUND FLOOR

3900864.00

NOVEMBER 2013

Drawn by
100002

Checked By

Sheet No. _____

SP-001

1 of 3



WHITE PLAINS
PUBLIC SCHOOLS

MAMARONECK AVENUE
ELEMENTARY SCHOOL
7 NOSBAND AVENUE
WHITE PLAINS, NY 10605

AMERA SITE PLAN

Louis Berger & Assoc., PC
565 Taylor Road
Carmel, NY 10523
TEL 212.758.9710 FAX 212.363.4341 WWW.LOUIBERGER.COM

KEY PLAN:



SITE PLAN
FIRST FLOOR

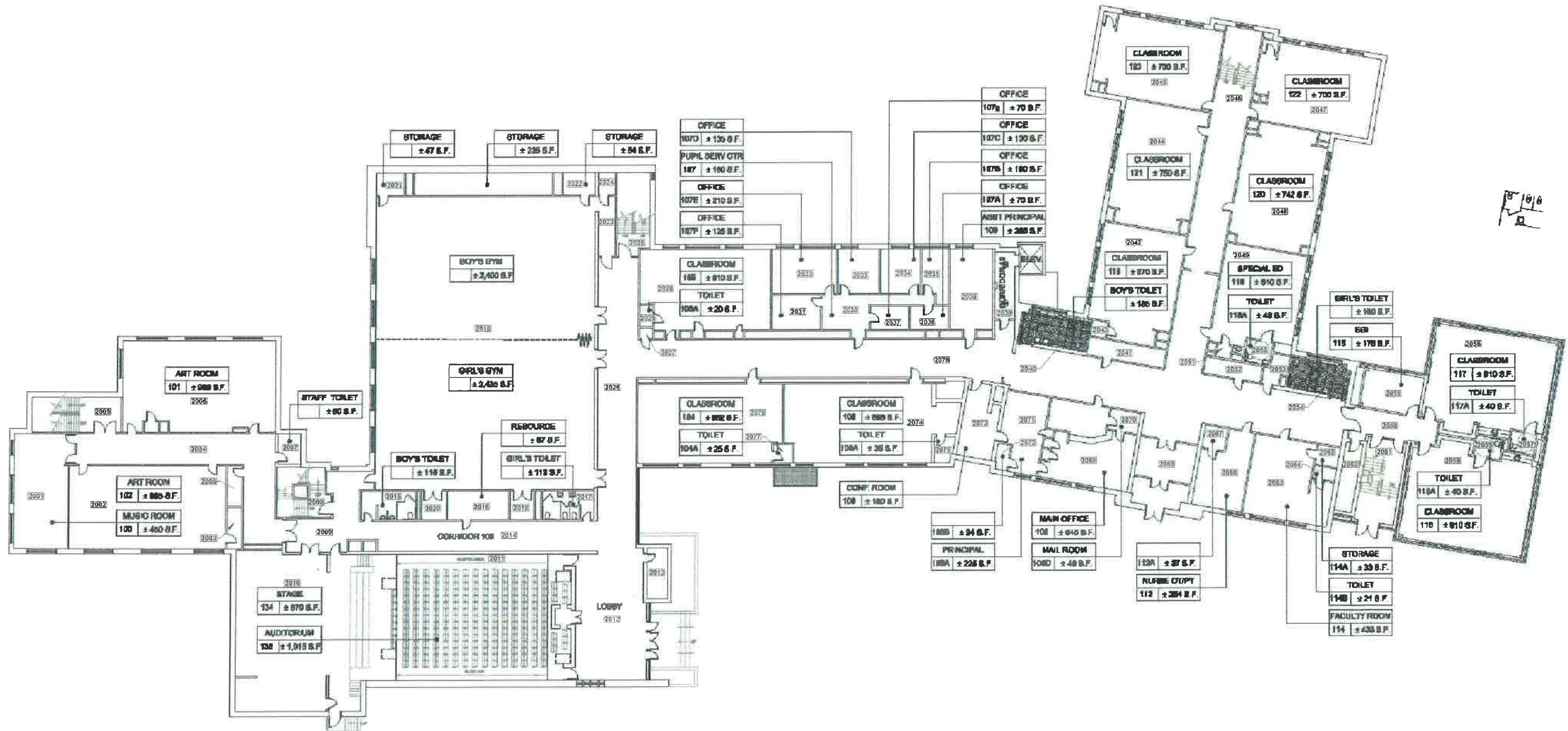
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JOB No
NOVEMBER 2013

Sheet No

SP-002

2 of 3



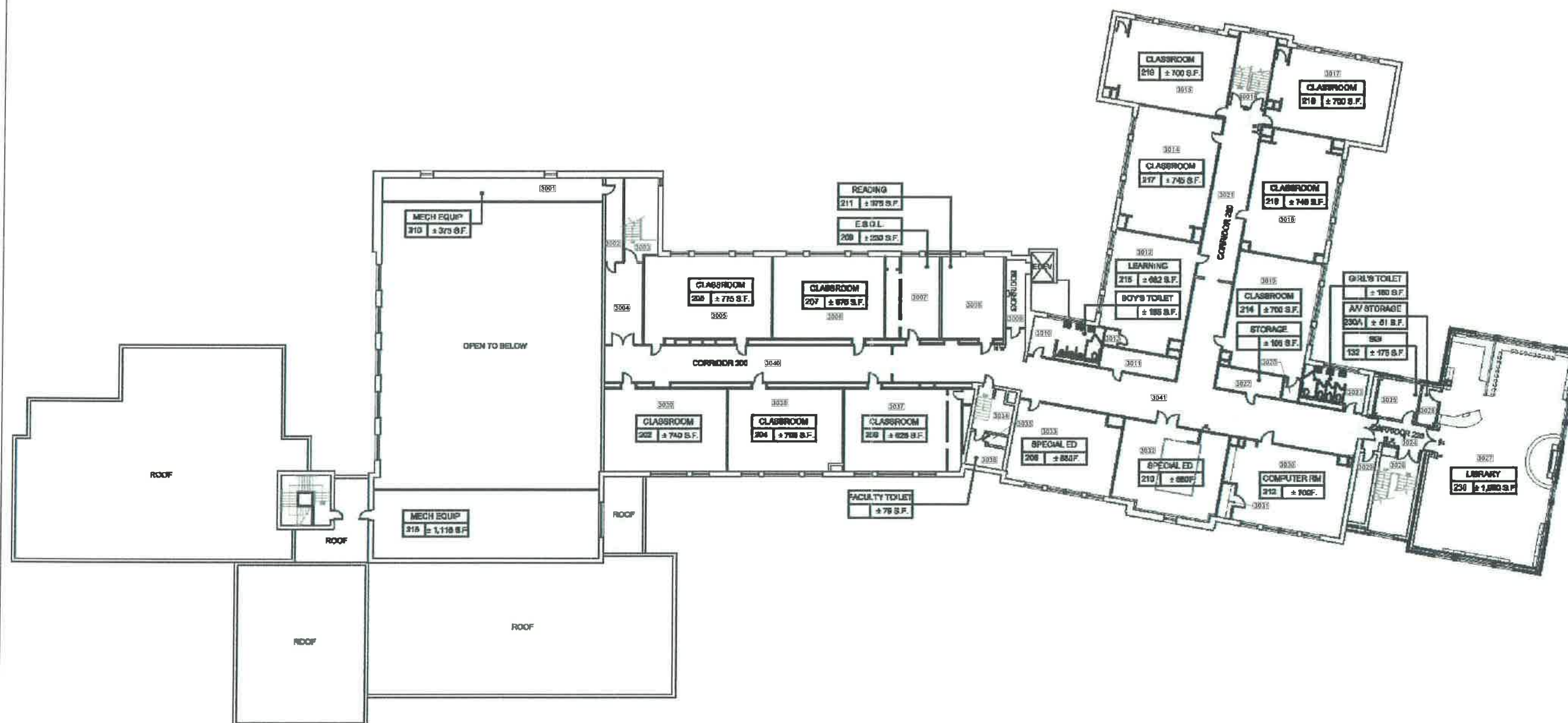
1 FIRST FLOOR PLAN
SCALE: NTS



MAMARONECK AVENUE
ELEMENTARY SCHOOL
7 NOSBAND AVENUE
WHITE PLAINS, NY 10605

 Louis Berger & Assoc., PC

565 Tuxter Road
Elmsford, NY 10523
TEL: 914-798-3710 FAX: 212-363-4341 WWW.LOUISBERGER.COM



No.	Date	Travel
Sheet Title		

3000864.00

Job No
NOVEMBER 2013

Drawn by	_____
Checked by	_____

Send to

SP-003

3 of 3

1 SECOND FLOOR PLAN
SCALE: NTS

SUMMARY OF SPACE



Louis Berger
565 Taxter Road, Suite 510
Elmsford, New York 10523

2016 AHERA 3 YEAR RE-INSPECTION REPORT MANAGEMENT PLAN UPDATE

**WHITE PLAINS PUBLIC SCHOOL
MAMARONECK AVENUE ELEMENTARY SCHOOL
7 NOSBAND AVENUE, WHITE PLAINS, NY 10605**

Space ID	Description / Common Name	HA	HA Description	Quantity	Assesment	Response Action			Comment
						Remove	Repair	O&M	
1063	Storage	1	9"x9" Floor Tile/Mastic	2 SF	X	-	-	2 SF	9"x9" Beige
-	Office / Storage	1	9"x9" Floor Tile/Mastic	276 SF	X	-	-	276 SF	Unable to Locate Material
		2	Wall Mastic	315 SF	X	-	-	315 SF	Unable to Locate Material
2018	Gym	7	2'x2' (1'x1' Design) Ceiling Tile	4,835 SF	X	-	-	4,835 SF	Assumed ACM
2023	Gym Hallway	1	9"x9" Floor Tile/Mastic	60 SF	X	-	-	60 SF	9"x9" Tan
2024	Gym Storage	1	9"x9" Floor Tile/Mastic	30 SF	X	-	-	30 SF	9"x9" Tan
-	SE Exit under Stairs	1	9"x9" Floor Tile/Mastic	900 SF	X	-	-	900 SF	Unable to Locate Material

ASSESSMENT CATEGORIES

- 1. = Damaged or Significantly Damaged TSI ACBM
- 2. = Damaged Friable Surfacing ACBM
- 3. = Significantly Damaged Friable Surfacing ACBM
- 4. = Damaged or Significantly Damaged Friable Miscellaneous ACBM
- 5. = ACBM with Potential for Damage
- 6. = ACBM with Potential for Significant Damage
- 7. = Any Remaining Friable ACBM or Friable Suspect ACBM
- X. = Not Applicable (Material is Nonfriable Surfacing or Miscellaneous Material)

**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: 031342519

CustomerID: LOUI56

CustomerPO:

ProjectID:

Attn: **Craig Napolitano**
The Louis Berger Group, Inc.
48 Wall St.
16th Floor
New York, NY 10005

Phone: (212) 612-7900
 Fax:
 Received: 10/30/13 3:10 PM
 Analysis Date: 11/1/2013
 Collected: 10/29/2013

Project: **WHITE PLAINS PUBLIC SCHOOL/ MAMARONECK AVE. ELEMENTARY SCHOOL/ THROUGHOUT BUILDING****Test Report:Asbestos Analysis of Bulk Material**

Test		Analyzed Date	Color	Non Asbestos		Asbestos
				Fibrous	Non-Fibrous	
Sample ID	01 031342519-0001		Description Homogeneity	GROUND FL/ WATER METER ROOM - 2'X4' FISSURED CEILING TILE/ WHITE Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB		11/1/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB		11/1/2013	White			None Detected
Sample ID	02 031342519-0002		Description Homogeneity	1ST FL/ RESOURCE ROOM 103 - 2'X4' FISSURED CEILING TILE/ WHITE Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB		11/1/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB		11/1/2013	White			None Detected
Sample ID	03 031342519-0003		Description Homogeneity	GROUND FL/ ROOM 015A - 2'X4' GOUGED CEILING TILE/ WHITE Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB		11/1/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB		11/1/2013	White			None Detected
Sample ID	04 031342519-0004		Description Homogeneity	1ST FL/ ART ROOM 101 - 2'X4' GOUGED CEILING TILE/ WHITE Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB		11/1/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB		11/1/2013	White			None Detected
Sample ID	05 031342519-0005		Description Homogeneity	GROUND FL/ BOYS TOILET 011B - 2'X2' SMOOTH CEILING TILE/ WHITE Heterogeneous		
PLM NYS 198.1 Friable						Not Analyzed
PLM NYS 198.6 VCM						Not Analyzed
PLM NYS 198.6 NOB		11/1/2013	White			Inconclusive: None Detected
TEM NYS 198.4 NOB		11/1/2013	White			None Detected

**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: 031342519

CustomerID: LOUI56

CustomerPO:

ProjectID:

Test Report:Asbestos Analysis of Bulk Material

Test		Non Asbestos		Asbestos
		Color	Fibrous Non-Fibrous	
Sample ID	06	Description	2ND FL/ ROOM 210 - 2'X2' SMOOTH CEILING TILE/ WHITE	
	031342519-0006	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	11/1/2013	White		Inconclusive: None Detected
TEM NYS 198.4 NOB	11/1/2013	White		None Detected
Sample ID	07	Description	1ST FL/ FACULTY ROOM 114 - 2'X4' LARGE GOUGED CEILING TILE/ WHITE	
	031342519-0007	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	11/1/2013	White		Inconclusive: None Detected
TEM NYS 198.4 NOB	11/1/2013	White		None Detected
Sample ID	08	Description	1ST FL/ FACULTY ROOM 114 - 2'X4' LARGE GOUGED CEILING TILE/ WHITE	
	031342519-0008	Homogeneity	Heterogeneous	
PLM NYS 198.1 Friable				Not Analyzed
PLM NYS 198.6 VCM				Not Analyzed
PLM NYS 198.6 NOB	11/1/2013	White		Inconclusive: None Detected
TEM NYS 198.4 NOB	11/1/2013	White		None Detected

**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: 031342519

CustomerID: LOUI56

CustomerPO:

ProjectID:

Test Report: Asbestos Analysis of Bulk Material

Test	Color	Non Asbestos		Asbestos
		Fibrous	Non-Fibrous	
PLM Scope: Leica #5 Ser. 411168628FT0021/ TEM Scope: JEOL / JEM-100CX II #03-02				

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:

PLM Scope: Leica #5 Ser. 411168628FT0021/ TEM Scope: JEOL / JEM-100CX II #03-02

Sample Receipt Date:: 10/30/2013 Sample Receipt Time: 3:10 PM

Analysis Completed Date: 11/1/2013 Analysis Completed Time: 4:30 PM

Analyst(s):

Albert Grohmann PLM NYS 198.6 NOB (8)

Evie Sioukri TEM NYS 198.4 NOB (8)

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

Er Grubbs 11/1/13 @ 4.95 per

**AHERA 3-YEAR RE-INSPECTION REPORT
AND MANAGEMENT PLAN
of
ASBESTOS CONTAINING MATERIALS**

Performed at:

ROCHAMBEAU ALTERNATIVE HIGH SCHOOL

Performed for:



**White Plains City School District
5 Homeside Lane
White Plains, NY 10605**

Prepared by:



**500 Summit Lake Drive, Suite 450
Valhalla, New York 10595**

Tel. (914) 798-3710

Fax (914) 592-1734

Project No. 31403469.039

Submission: August 2022



TABLE OF CONTENTS

<u>Section</u>	<u>Subject</u>	<u>Tab/Page</u>
1.0	<u>SCOPE OF WORK</u>	1
1.1	<u>ORIGINAL MANAGEMENT PLAN REVIEW</u>	1
1.2	<u>FIELD INSPECTION</u>	2
1.3	<u>UPDATE OF THE ORIGINAL MANAGEMENT PLAN</u>	3
1.4	<u>UPDATE MANAGEMENT PLAN REVIEW WITH DISTRICT LEA DESIGNEE</u>	3
2.0	<u>SITE DESCRIPTION</u>	5
3.0	<u>ASSESSMENT OF ACBM</u>	6
3.1	<u>ACBM CATEGORIES</u>	6
3.2	<u>RESPONSE ACTIONS</u>	7
3.3	<u>ADDITIONAL INSPECTION AND ASSESSMENT CONDITIONS</u>	8
3.4	<u>RE-INSPECTION FINDINGS</u>	9
4.0	<u>OPERATIONS AND MAINTENANCE PROGRAM</u>	9
4.1	<u>DEFINITIONS</u>	10
4.2	<u>WORKER PROTECTION</u>	14
4.3	<u>RESPIRATORY PROTECTION PROGRAM</u>	16
4.4	<u>WORKER TRAINING</u>	17
4.5	<u>PERSONAL AND AREA AIR MONITORING</u>	18
4.6	<u>CLEANING PROCEDURES</u>	18
4.7	<u>OPERATIONS, MAINTENANCE AND REPAIR PROCEDURES</u>	19
4.8	<u>WASTE DISPOSAL</u>	26
4.9	<u>WARNING LABELS</u>	27
4.10	<u>NOTIFICATIONS OF AFFECTED PARTIES</u>	27
4.11	<u>SUGGESTED OPERATIONS AND MAINTENANCE EQUIPMENT</u>	28
4.12	<u>DOCUMENTATION AND RECORD KEEPING</u>	28
5.0	<u>LEA DESIGNATED PERSON</u>	29



APPENDICES

- APPENDIX 1: SITE PLAN
- APPENDIX 2: HOMOGENEOUS AREA SHEETS
- APPENDIX 3: HAZARDOUS ASSESSMENT FORM
- APPENDIX 4: AHERA 3 YEAR RE-INSPECTION AND 6 MONTHS PERIODIC SURVEILLANCE FORM
- APPENDIX 5: BULK SAMPLE ANALYSIS RESULTS AND PREVIOUS SAMPLING DATA
- APPENDIX 6: INSPECTORS' AND MANAGEMENT PLANNERS' CERTIFICATIONS
- APPENDIX 7: SUMMARY OF ABATEMENT ACTIVITIES
- APPENDIX 8: 40 CFR PART 763 (EPA AHERA)



1.0 SCOPE OF WORK

On October 30, 1987, the U.S. Government issued a final rule under Section 203 of Title II of the Toxic Substances Control Act (TSCA) entitled Asbestos Containing Materials in Schools, 40 CFR Part 763 (as amended through December 31, 2002). The Environmental Protection Agency (EPA) was charged with enforcing this ruling, which was the result of federal legislation known as the Asbestos Hazard Emergency Response Act (AHERA). This action represented a substantial expansion of the 1982 version of 40 CFR Part 763, and placed following additional burdens on the Local Education Agency (LEA):

- All local education agencies (LEAs) identify ACBM in their school buildings. Once doing so, the LEAs must submit a Management Plan to the State Education Department by October 12, 1988.
- At least once every six months after the Management Plan is in effect; the LEA Designee shall conduct a periodic surveillance in each school building containing ACBM. Non-accredited personnel may perform the periodic surveillance. The surveillance requires that a visual inspection of all areas that have been identified in the Management Plan as ACBM be conducted and any changes in the condition of the ACBM be noted. This information shall be recorded as well as the date and the name of the person performing the surveillance. This information should be submitted to Designated Person to be included in the Management Plan.
- At least once every three years, the LEA must have a re-inspection of its building. The re-inspection must be performed by an accredited inspector who should recheck all ACBM or assumed ACBM and reassess any changes in its condition. This information should be included within the Management Plan.

WSP has been retained by White Plains City School District to perform the 2022 AHERA 3-year re-inspection of their school district. The re-inspection process consists of four phases prior to final submission. The four phases are: 1) management plan review, 2) field inspection, 3) update of the original management plan, and 4) review of the new, updated management plan with the LEA Designee of the school district.

1.1 ORIGINAL MANAGEMENT PLAN REVIEW



The initial phase requires the accredited inspector and/or management planner to review the original management plan. The inspector ascertains for each school building in the district, all the materials that were assumed or confirmed to contain asbestos through bulk sample analysis. The locations, material type (surfacing, thermal system insulation (TSI), or miscellaneous), and quantities for each homogeneous area are identified.

Based on the information compiled during the management plan review provided by the school district, the inspector then develops a field re-inspection form which will be utilized in phase 2 (field inspection).

1.2 FIELD INSPECTION

The second phase is the actual inspection of the materials assumed or confirmed to contain asbestos in the original management plan for each building. The inspector enters a space, which was shown to contain asbestos during the original inspection. The inspector determines if the ACBM(s) is still present in the room or if it has been abated. If the ACBM(s) is still present, the inspector confirms the quantity of material(s), checks to see if the material(s) is friable and observes the condition of the material(s) for damage. This information is then recorded on the field inspection forms. Additionally, any useful information, which may be used in updating the management plan, is noted. The inspector continues the process throughout each school building.

If during the inspection the inspector observes any previously unidentified suspect materials, a bulk sample may be collected to determine if the material contains asbestos. Bulk samples are taken only with the approval of the LEA Designee of the school district. If bulk samples are not collected, then the material is assumed to contain asbestos.

On June 13, 2022 an AHERA re-inspection of Rochambeau Alternative Elementary School was performed by the following New York State Department of Labor (NYSDOL)/AHERA licensed inspector(s).

Name	NYSDOL #	Exp. Date
Zachary Collins	21-09230	4/23
Jordan Wong	09-09397	2/23

The management plan was developed by the following NYSDOL/AHERA licensed Management Planner(s):

Name	NYSDOL #	Exp. Date
Alexander Smolyar	12-07624	10/23

Note: Copies of current certificates are included in Appendix 6.

This inspection report updates the information and conditions on all ACBM described and assessed in the original report(s). In addition, any ACBM which was not identified in the original inspection but was discovered during this survey has been included in this report.



1.3 UPDATE OF THE ORIGINAL MANAGEMENT PLAN

The third phase of the re-inspection is updating the original management plan. The management plan is written by a state certified management planner. The inspector sorts the data collected during the actual inspection into tabulated forms based on the space I.D. # and the type of material. The Management Planner then determines the necessary response actions required to be taken by the school district in order to maintain the ACBM and develops the new, updated management plan.

1.4 UPDATE MANAGEMENT PLAN REVIEW WITH DISTRICT LEA DESIGNEE

The fourth phase of the re-inspection is a review of the updated management plan with the school district's LEA Designee in order to familiarize the LEA Designee with the information contained in the management plan. The Management Planner and the LEA Designee review the data collected and the response actions recommended. Any appropriate recommendations made by the LEA Designee are incorporated into the management plan before final submission. The LEA Designee then signs the final copy of the management plan.

In the future, the Management Plan must be updated whenever an abatement of ACBMs is performed. The six-month periodic surveillance of the school district is still required after the re-inspection.

In New York State, the School Asbestos Safety Act (SASA) located in the New York State Education Law Sections 430 thru 437, also requires the LEA for the District to re-inspect the buildings for ACBM every three years. SASA requires the LEA to submit the AHERA 3-year re-inspection data to the New York State Education Department via electronic reporting form. These forms are generally supplied to the District at the beginning of the re-inspection with dates when the re-inspection must be completed and submitted by.

This 3-year re-inspection cannot accurately determine all ACM that may be present in or behind walls, ceilings and floors. Before the start of any renovation project, existing plans and specifications regarding the building materials used in construction (i.e. plaster materials, gypsum board, pipe insulation, etc.) should be reviewed. If necessary, access holes may be made in the walls, ceilings and/or floor to look for ACM pipe insulation. Properly trained personnel should perform this work. If a suspect material is found, bulk sampling should be conducted prior to construction to protect workers from possible exposure and contamination.

During the original inspection, not all varieties of floor tiles used in the buildings were sampled and analyzed. Some floor tiles were assumed to contain asbestos. These tiles are non-friable as long as they remain in good condition. The floor tile, floor tile mastic, and/or the under lying felt paper must be sampled prior to any renovation or removal project which will disturb the materials.

Fire doors have also been assumed to contain asbestos in the core as a fire retardant. If the doors are to be removed, drilled or affected where the interior would be exposed, the necessary precautions should be taken.



Roofing materials, which are not covered by the 3-year re-inspection, should be considered as suspect materials. Core samples down to the substrate of all homogeneous roofing materials should be collected and analyzed for asbestos before the start of any renovation project.

Bulk sample collection must be conducted by a NYSDOL licensed inspector(s) with valid certificate(s), and an ELAP accredited laboratory should perform all bulk sample analysis.

The Operations and Maintenance Plan found in Section 4.0 of the management plan must be kept up to date. It contains important information for working with and maintaining materials that contain asbestos.



2.0 SITE DESCRIPTION



Rochambeau Alternative High School

228 Fisher Avenue

White Plains, New York 10606

Number of Levels: Five (5) Levels

Re-inspection Date(s): January 24, 2022

Building Contains: Friable and Non-Friable ACBM



3.0 ASSESSMENT OF ACBM

3.1 ACBM CATEGORIES

The ACBM's at the school were inspected and described in each building space accessible by nondestructive means. The inspector(s) assessed all friable known or assumed ACBM in the school building in accordance with 40 CFR Part 763.88. In addition, all other non-friable ACBM were also assessed. Hazardous Assessment form, which is located in Appendix 3, lists a space by space description of the ACBM and their appropriate response actions.

The ACBM and assumed ACBM were classified according to these categories in 40 CFR Part 763.88:

1. **DAMAGED OR SIGNIFICANTLY DAMAGED THERMAL SYSTEM INSULATION (TSI).** Plumbing and HVAC mechanical equipment insulation with greater than 1 percent damage;
2. **DAMAGED FRIABLE SURFACING ACBM.** Sprayed or troweled on coating material applied to interior structural components. Damaged less than 10 percent (evenly distributed throughout the material) or 25 percent (localized);
3. **SIGNIFICANTLY DAMAGED FRIABLE SURFACING ACBM.** Same description as No. 2 with damage extent greater than 10 percent (distributed) or 25 percent (localized);
4. **DAMAGED OR SIGNIFICANTLY DAMAGED FRIABLE MISCELLANEOUS ACBM.** Friable ACBM, excluding thermal system insulation or surfacing material with damage greater than 1 percent;
5. **ACBM WITH POTENTIAL FOR DAMAGE.** Material susceptible to physical, water or other damages;
6. **ACBM WITH THE POTENTIAL FOR SIGNIFICANT DAMAGE.** Material easily susceptible to physical, water or other damages;
7. **ANY REMAINING FRIABLE ACBM OR FRIABLE SUSPECTED ACBM.**

The ACBM's in each functional space were assessed as to the location and quantity of material, friability, severity of damage (percentage of total amount), extent of damage (scattered or localized), and type of damage (flaking, blistering, water damage or other signs of physical damage). Other considerations that were taken into account included whether the material was accessible, the material's potential for disturbance, known or suspected causes of damage (e.g., air erosion, vandalism, vibration, water, etc.), and preventive measures which might eliminate the reasonable likelihood of undamaged ACM from becoming significantly damaged.



3.2 RESPONSE ACTIONS

According to 40 CFR Part 763.88(d), the LEA shall select a person fully accredited to develop management plans. NYS and AHERA accredited personnel reviewed the results of the inspection and assessment for the facility. When choosing among the various response actions, a number of factors were taken into consideration including, but not limited to, damage, potential for damage, type of material, and any planned renovations or change of use for the building area. The response actions were planned following a 2 fold strategy. First, in order to eliminate any imminent health risk, all areas which contain significantly damaged ACBM will be abated in a timely fashion. The second series of response actions are to repair, or abate where repair is not feasible, damaged ACBM. The final series of response actions are primarily precautionary steps to ensure that damage is not inflicted upon ACBM which currently exists in an intact state. The specific action taken will depend upon accessibility of the area, current occupancy, and the degree of any possible air erosion. These areas, as well as all remaining ACBM, shall be under constant surveillance until the material is ultimately removed.

Hazardous Assessment Form identifies the recommended appropriate response actions on a space by space basis. At a minimum, the response actions conform with 40 CFR Part 763.90. These response actions are consistent with the assessments and are intended to protect human health and the environment.

Hazardous Assessment Form, found in Appendix 4 of this report, list the response actions in the form of these three response action codes:

- 1. REMOVAL**
- 2. REPAIR**
- 3. OPERATIONS & MAINTENANCE (O&M)**

Combinations of response action codes for each functional space represent the recommended actions to be performed in order to comply with minimum responses outlined under 40 CFR Part 763.90. It is the LEA's responsibility to ensure implementation of the appropriate response action consistent with the assessment findings. The LEA shall arrange to have the actions designed and completed by NYS and EPA accredited persons. The LEA shall select those response actions which protect human health and the environment, according to the least burdensome method.

If damaged or significantly damaged asbestos containing TSI is present, the LEA must at least clean the area surrounding the damage and repair the damage points. It is recommended that all TSI be included in an Operations and Maintenance (O&M) program according to 40 CFR Part 763.91 and as part of the management plan. Removal of asbestos containing TSI is recommended whenever economically feasible or when school renovation and/or demolition may impact on the material.

If damaged friable surfacing ACBM or damaged friable miscellaneous ACBM has been identified, the LEA may choose encapsulation, enclosure, removal or repair of the damaged material. The AHERA regulation requires the LEA to determine which of the appropriate response actions best protects human health and the environment. The LEA may then determine the least burdensome



response action based on local circumstances such as building occupancy and use patterns and economic concerns such as short and long term costs. Wherever this material has been repaired, encapsulated or enclosed, the LEA should implement an O&M program until the material has been removed.

If significantly damaged friable surfacing or miscellaneous ACBM is present, the LEA shall determine whether there is a need to isolate and/or restrict access to the functional space. The LEA must then encapsulate, enclose or remove as necessary to protect human health and the environment. Where material has been repaired, encapsulated or enclosed, the LEA shall implement an O&M program until the material has been removed.

If any surfacing, thermal system or miscellaneous ACBM that has the potential for damage is present in the school building, the LEA shall implement an O&M program. The LEA should take preventative measures as part of the management plan to eliminate the likelihood that the ACBM or its protective cover shall be disturbed, damaged, deteriorated or delaminated.

If any surfacing, thermal or miscellaneous ACBM that has the potential for significant damage is present in the school building, the LEA shall implement an O&M program. The LEA should take preventative measures as part of the management plan to eliminate the likelihood that the ACBM or its protective coating shall be disturbed, damaged, deteriorated or delaminated. These measures must remain in place until the material has been removed.

If the appropriate preventative measures cannot be effectively implemented, the LEA should determine whether there is a need for the functional space to be isolated and access to it restricted. The ACBM should be removed, or other acceptable abatement action taken, as soon as possible to protect human health and the environment.

Asbestos abatement actions other than small scale, short duration repairs as defined under AHERA and according to New York State requirements must be designed by persons accredited to design response actions. All asbestos abatement activities shall be performed according to federal, state and local regulations.

3.3 ADDITIONAL INSPECTION AND ASSESSMENT CONDITIONS

In addition to the information included in this report, the LEA should be aware of the following:

- A.** Any building materials on the exterior of the building, structural building materials, such as cinderblock, and undiscovered materials are not part of this AHERA inspection. Prior to any disturbance of the above materials, samples shall be collected and analyzed for asbestos content by a licensed inspector and an accredited laboratory. Materials defined as undiscovered shall include all suspected ACBM in concealed spaces and those not identified in the functional spaces inspected.
- B.** All future building materials -- mastics, adhesives, building components -- to become part of the building structure should be checked for asbestos content.



- C. All materials in the AHERA survey which were assumed to contain asbestos should be re-sampled and analyzed by a licensed inspector and an accredited laboratory prior to any disturbance thereof.
- D. The descriptions of homogenous material types and colors of the materials found in this survey are subjective. Notify the inspector in writing with any questions concerning these descriptions.
- E. Square footages, lengths and other dimensional descriptions are approximate and should be verified prior to designing or scheduling any abatement activity.
- F. All actions pursuant to AHERA and to all other applicable regulations should be kept up to date at all times within the management plan.

3.4 RE-INSPECTION FINDINGS

A. Rochambeau Alternative Elementary School

The following is a listing of priority areas for the school with recommended response actions. A complete listing of the conditions of all ACM reassessed in the building during inspection can be found in appendix 3.

1.	Location:	Space I.D #1022 – Storage
	ACM:	9”x9” Floor Tile/Mastic
	Homogeneous Material:	1
	Condition:	Minor Damage
	Recommended Response Action:	Remove

All other areas which contains assumed or confirmed asbestos containing building materials should be maintained under operations and maintenance (O&M) procedures, unless otherwise noted.

4.0 OPERATIONS AND MAINTENANCE PROGRAM

O&M REQUIREMENTS FOR SCHOOL PERSONNEL AND/OR CUSTODIAL STAFF:

In case of a fiber release episode where ACBM or assumed ACBM is damaged or disturbed, the school personnel and/or custodial staff shall contact Buildings & Grounds office at (914) 422-2050, or District LEAs Mr. Frank Stefanelli or Xavier Hernandez-Delgado at (914) 422-2050.

O&M REQUIREMENTS FOR ASBESTOS CONTRACTOR PERFORMING O&M WORK:

The asbestos contractor performing O&M work shall adhere to the following program.



The asbestos management program has been revised for the school based on the inspection results. The revised management plan must be kept on school premises and be readily available during normal business hours without cost or other restriction, for inspection by the EPA, state representatives and the general public which includes teachers, other school personnel and their representatives, and parents. The LEA shall adhere to these as well as all other applicable regulatory requirements. The LEA shall initiate an operations and maintenance program whenever ACBM is present in a regulated building (40 CFR Part 763.91). An O&M program outlines the series of work practices required to maintain friable ACBM in good condition, to insure clean up of asbestos fibers previously released, and to prevent further release by minimizing and controlling damage to the ACBM. The elements of an O&M program include notification and labeling, employee training, worker protection and medical surveillance, cleaning and maintenance operations, fiber release episode management, periodic surveillance and record keeping.

The New York State regulations adopted in Title 12 of the Official Compilation of Codes, Rules, and Regulations, Part 56 has been adopted to require appropriate training and certification for those persons employed or contracted to handle asbestos, including the supervision of such actions. The guidelines have set forth standards and procedures that shall be followed when removal, enclosure, encapsulation, repair or disruption of asbestos or asbestos containing materials has occurred. An inspection and enforcement program within the NYSDOL has been established to address such actions. Since Industrial Code Rule 56 applies to public authorities, i.e. the LEA's, it is recommended that a full understanding of the rule be obtained prior to the implementation of the O&M program.

4.1 DEFINITIONS

Abatement: Procedures to control fiber release from asbestos material. This includes removal, encapsulation, enclosure, repair, disturbance of friable asbestos or any handling of asbestos material that may result in the release of asbestos fiber.

Accessible: When referring to ACM, the material is subject to disturbance by school building occupants or custodial or maintenance personnel in the course of their normal activities.

Asbestos Containing Material (ACM): In reference to school buildings, any material containing more than one percent asbestos.

Asbestos Containing Building Material (ACBM): Surfacing ACM, thermal insulation or miscellaneous ACM found in or on interior structural members or other parts of a building.

Asbestos Debris: Fragments of ACBM that can be identified by color, texture or composition. This may include dust if confirmed by a licensed inspector.

ACBM Condition:

Good: No visible damage or deterioration, or showing only very limited damage or deterioration.



Damaged: Physical injury or deterioration such that the internal structure of the material is inadequate, material which has delaminated such that its bond to the substrate is inadequate, or which lacks fiber cohesion or adhesion properties for any other reason. Thermal system insulation (TSI) is considered damaged when it is lacking part or all of its covering. Such damage may be shown by the separation of ACM into layers; flaking, blistering, or crumbling; water damage or stains; scrapes, mars or gouges; exposed TSI beneath its covering.

Significantly Damaged: Damage that is extensive and severe.

Action Level: An airborne concentration of asbestos of 0.1 fibers per cubic centimeter of air calculated as an 8 hour TWA (Time Weighted Average).

AHERA: The Asbestos Hazard Emergency Response Act. Signed into law on October 22, 1986 by former President Ronald Reagan. It required schools to identify asbestos containing materials in buildings, institute programs aimed at minimizing the risk of asbestos exposure in those buildings, and re-inspect those materials at least every three years.

Amosite: (Brown Asbestos) an asbestiform mineral of the amphibole group. It is the second most commonly used form of asbestos in the U.S.

Asbestos: A naturally occurring fibrous incombustible mineral, which is known to be carcinogenic when, inhaled or ingested.

Assessment: Evaluation of the physical condition and potential for damage of all friable ACBM and asbestos-containing thermal system insulation. AHERA requires classification of each ACBM assessed into one of seven categories based on material type and damage/potential for damage.

Bulk Sample: A small portion of a suspect asbestos containing building material collected by the inspector for laboratory analysis to determine asbestos content.

Chrysotile: (White Asbestos) the only asbestos form mineral of the serpentine group. It is the most common form of asbestos used in buildings.

Contractor: A public authority or any other governmental agency or instrumentality thereof, self employed person, company, unincorporated association, firm, partnership or corporation and any owner or operator thereof, which engages in an asbestos project or employs persons engaged in any phase of an asbestos project.



Encapsulant: A liquid material which can be applied to asbestos-containing material and which prevents the release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

Encapsulation: The treatment of ACBM with a material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers. Two common types of encapsulant are bridging (surface binding) and penetrating.

Enclosure: An airtight, impermeable, permanent barrier around ACBM to prevent the release of fibers.

EPA: The United States Environmental Protection Agency, Region II, Air and Hazardous Material Division. As of 1995, located at 26 Federal Plaza, New York, N.Y. 10278.

Fiber Release Episode: Any uncontrolled or unintentional disturbance of ACBM resulting in visible emissions.

Friable: Material that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. This includes previously non-friable material that after becoming damaged to the extent that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Functional Space: Room or group of rooms, or homogenous area.

High Efficiency Particulate Air (HEPA): Refers to a mechanical filtration system capable of trapping and retaining at least 99.97% of all non-dispersed particles 0.3 microns in equivalent diameter or larger.

Homogeneous Area: An area of surfacing material, thermal system insulation material, or miscellaneous material that is uniform in color and texture.

Inspector: Any person who performs the limited tasks involved in the survey, identification, and assessment of the condition of asbestos and asbestos material and the recording and reporting thereof, or who is involved in the collection of bulk samples of asbestos material or suspected asbestos material for laboratory analysis.

LEA: Local Education Agency, the governing authority of a school.



Management Plan: A document that describes all activities planned and undertaken to comply with all regulations, such as building inspections to identify asbestos-containing materials, response actions, and operations and maintenance programs to minimize the risk of exposure to asbestos.

Management Planner: Any person who assesses the hazard posed by the presence of asbestos or asbestos containing material and/or who recommends appropriate response actions and a schedule for such response actions.

Miscellaneous Material: Interior building material on structural components or fixtures such as floor or ceiling tiles.

NESHAP: The National Emission Standards for Hazardous Air Pollutants, EPA rules under the Clean Air Act.

NYSDOL: The New York State Department of Labor.

OSHA: The Occupational Safety and Health Administration. As of 1990, located at 200 Constitution Avenue, N.W., Washington, D.C. 20210.

Operations and Maintenance Program: A program of work practices to maintain ACBM in good condition, to insure clean up of asbestos fibers previously released, and to further prevent fiber release by minimizing and controlling damage to ACBM.

Periodic Surveillance: A visual examination for any change in material condition of ACBM and assumed ACBM in a building.

Personal Protective Equipment: Clothing, head gear, eye protection, footwear and gloves as required.

PLM: Polarized Light Microscopy.

Re-inspection: The re-examination, by an accredited inspector, of a building for which an original inspection was previously performed, including a re-evaluation and response action recommendations by an accredited management planner.

Removal: The taking out or stripping of ACBM from a functional space or substrate.



Repair: A corrective action using specified work practices to return damaged ACBM to an undamaged condition to prevent fiber release.

Response Action: Methods including removal, encapsulation, enclosure, repair, and operations and maintenance that protect human health and the environment from friable ACBM.

Restricted Handler: Any person performing any limited or special tasks in preparation for or ancillary to an asbestos project, such as a carpenter, electrician, plumber, or similar occupation, or any other person who may incidentally disturb asbestos during the course of any employment.

Routine Maintenance: An area, such as a boiler room or mechanical room, that is not normally frequented by students and in which maintenance employees or contract workers regularly conduct maintenance activities.

Space I.D.: Number assigned to a room or space during the original inspection.

Surfacing Material: A material that is sprayed-on, troweled-on, or otherwise applied to surfaces (e.g. acoustical plaster or fireproofing materials on structural members).

Suspect Material: Building material suspected to contain asbestos because of past practices in its manufacture and use.

Thermal System Insulation (TSI): Material applied to pipes, fittings, boilers, breeching, tanks, ducts, etc. generally to prevent heat loss or gain.

4.2 WORKER PROTECTION

A. PROTECTIVE CLOTHING AND DECONTAMINATION PROCEDURES

EPA regulation 40 CFR Part 763.91(b) serves to extend the protection provided by 40 CFR Part 763.121 (school employee protection during asbestos related projects) to any employees performing O&M and repair activities on ACM not covered by OSHA's 29 CFR 1910.1001 and 29 CFR 1926.1101 (General Industry and Construction Standards for Asbestos). These standards shall be adhered to where applicable during all O&M operations involving the disturbance of ACBM.

The employees of the LEA who clean up, repair or otherwise disturb ACBM are required to wear protective clothing and respirators. The protective clothing shall consist of full body disposable coveralls (Tyvek or equivalent). The worker shall remove all street clothes, undergarments, jewelry, watches, etc. before putting on protective clothing. A respirator shall be put on under the hood or head covering and will be the last item removed during decontamination.



Upon completion of the work, workers shall HEPA vacuum and wet wipe the outside of the protective clothing, including the respirator. The protective coveralls shall be removed and placed in 6 mil plastic bags and discarded as asbestos waste. The worker shall shower after removing protective clothing. Workers shall not remove the respirator until they are in the shower and have thoroughly wet their hair and body and washed the exterior of the respirator. Respirator cartridges shall be removed and disposed of as asbestos waste. Protective boots or shoes shall be HEPA vacuumed and wet wiped during decontamination and stored in a 6 mil polyethylene disposable bag and used only for asbestos work. A shower filtration system to filter asbestos fibers from the water shall be used and shall conform with all applicable regulations. Portable shower units are readily available, inexpensive and easy to install and transport.

If showering facilities are not available and if allowable by federal, state and local regulations, the workers shall proceed to remove all street clothing, as described above, and wear two sets of protective clothing. Gloves shall be worn in addition to the respirator. The workers shall duct tape all openings or potential openings to keep out asbestos fibers. Upon completion of the work, workers shall HEPA vacuum and wet wipe the outer layer of coveralls, including the respirator. Upon removal, the outer layer of protective coveralls shall be placed in 6 mil plastic bags and discarded as asbestos waste. With the respirator still on and wearing the second layer, the worker shall proceed to the nearest shower. The workers shall then remove the coveralls and take a complete shower or wash the outside of the respirator, hands, face and arms. The coveralls and respirator cartridges shall be disposed of as asbestos waste. The workers may then re-dress in street clothing.

B. MEDICAL MONITORING PROGRAM

EPA's Worker Protection Rule, 40 CFR Part 763.121, has been set forth to apply to maintenance staff at schools whose activities include operations and maintenance on or around ACBM. Medical monitoring has been specified where ACM exposure is likely to exceed the OSHA Permissible Exposure Level of 0.1 fibers per cubic centimeter of air (f/cc) calculated as an 8 hour Time Weighted Average (TWA) during the course of work. The program must be provided at the cost of the LEA and consist of the following elements:

- i. Preplacement Examination [40 CFR Part 763.121(f)(2)]
To be provided within 30 days of employment and shall include medical history, chest x-ray, and pulmonary function test (PFT).
- ii. Annual Examination [40 CFR Part 763.121(j)(3)]
To include an update of the medical history, chest x-ray, (at minimum every five years 29 CFR 1910.1001, Table 2) and PFT.
- iii. Termination Examination [40 CFR Part 763.121(j)(4)]
To be provided within 30 days pre- or post- termination date and will include medical history, chest x-ray and PFT.
- iv. Medical Records [40 CFR Part 763.121(j)(6)]



Records of employees shall be maintained complete and accurate for at least 20 years. Medical examination records shall be made available for inspection and copying to the EPA, Assistant Secretary of Labor for Occupational Safety and Health, the Director of National Institute for Occupational Safety and Health (NIOSH) and their physicians and medical consultants, and upon the request of an employee or former employee to the physician.

The physician who conducts the medical examination shall provide the required information to the employer along with any other medical information related to occupational exposure to asbestos fibers as per the regulatory requirements.

4.3 RESPIRATORY PROTECTION PROGRAM

Information on the use of respiratory protection as contained in the EPA/NIOSH "Guide to Respiratory Protection for the Asbestos Abatement Industry" (September 1986, EPA 560/OPTS-86-001), available from TSCA Assistance office (T5-799), Office of Toxic Substances, EPA rm E-543, 401 M Street, S.W., Washington DC, 20460.

Respirators shall be provided to all workers performing asbestos related activities. The respirator will be appropriately fit-tested to ensure that it functions effectively for that individual. Each respirator will be supplied with disposable cartridges approved for asbestos dust by NIOSH and will be worn at all times during abatement activities.

A physician must determine that workers are physically fit to wear the respirator while working. A physical exam should be performed and should include complete work history, pulmonary function exam with full chest x-ray in addition to full physical. This procedure is repeated annually thereafter and also within 30 days of an employee's termination. The x-rays administered during the course of this medical exam shall be interpreted by a NIOSH certified B-Reader.

Respirators used shall be approved jointly by NIOSH and Mine Safety and Health Administration (MSHA) as well as all other federal, state and local agencies governing this type of work. All filters shall be purple or magenta colored canisters with HEPA filters. Respirator filters and any replacement parts must be purchased from the manufacturer. At no time can parts from different respirators be interchanged. The instructions and recommendations of the respirator manufacturer shall be followed concerning decontamination, removal and filter replacement.

Respirators should be inspected before and after each use. Specific items to check during these inspections will depend on the type and manufacturer of the respirator (see owners instruction booklet for proper procedures). Examples of what to inspect include checking the silicone rubber face pieces, straps, flexible hose, intake and exhaust valves, etc.

Each respirator should be cleaned and sanitized after each use. A mild disinfectant soap and water may be used or any other type of product designed for respirator cleaning. After cleaning the respirator should be hung and allowed to air dry before being used again. Respirators should not be stored in a manner that will disfigure or damage the unit. Storage of the unit near corrosive chemicals or strong sunlight will accelerate the deterioration of the face piece.



Each worker who wears a respirator shall be fit tested to ensure a tight seal where the face comes in contact with the mask. Workers who have beards or excessive facial hair will not be able to carry out asbestos related work. One example of a fit test is the qualitative check of the respirator to face seal using a chemical smoke irritant, saccharin or banana oil every six months for each brand and size respirator an employee shall wear. This testing should be carried out by a qualified health/safety professional.

4.4 WORKER TRAINING

The LEA must provide awareness training of at least two hours to maintenance engineers and custodial workers who are employed by the LEA and work in buildings that contain ACBM. This awareness training is required whether or not these individuals work with ACBM. New employees shall be trained within 60 days after they begin work. The training shall include, at a minimum, information about asbestos and its different uses and forms, background concerning health effects associated with asbestos exposure, the locations of ACBM as identified throughout each school building, the recognition of damage, deterioration and delamination which is related to exposure potentials, the name and phone number of the individual who has been designated as the LEA Asbestos Coordinator, and the location of the management plan.

The LEA is also required to provide in depth training to those employees who conduct any activity which will result in the disturbance of ACBM. The training shall include the previously described two hour awareness as well as 14 additional hours. The additional 14 hours shall include, at minimum, descriptions in the proper methods of handling ACBM; proper use of protective equipment such as respirators, disposable clothing, HEPA vacuums, etc.; complete description of the requirements of AHERA and other federal, state and local regulations; and hands-on training in the use of personal, protective equipment and work procedures.

All forms of training provided shall emphasize the necessity to not disturb ACBM during routine maintenance activities. Employees shall be instructed at a minimum to follow these standards:

- i. Avoid performing any activities on ACM that may cause abrasion or physical deterioration of the material. This includes sanding, nailing, drilling, cutting or otherwise damaging the material.
- ii. Avoid damaging the ACM during maintenance activities **NOT** directly involving the ACM such as installing drapes, carpets, moving furniture, etc.
- iii. Always use a HEPA vacuum and the wet method to clean asbestos dust or debris.

NEVER USE A REGULAR VACUUM OR DRY METHOD.

- iv. Avoid any activity that may inadvertently release asbestos fibers into the air such as removing contaminated or potentially contaminated ventilation filters, drying and/or shaking the filters, or removing suspended ceiling tiles below ACM without taking the proper precautions and using the proper personal protective equipment.



4.5 PERSONAL AND AREA AIR MONITORING

A requirement of 40 CFR Part 763.91 is that the LEA ascertain, through monitoring or historical data, the airborne concentration of asbestos fibers during all maintenance and repair activities involving ACBM or assumed ACBM. Coverage of EPA's worker protection rule under 40 CFR Part 763.121 is directed to maintenance staff at schools who perform O&M activities.

OSHA has established and EPA has adopted a Permissible Exposure Limit (PEL) of 0.1 f/cc over an 8 hour time weighted average (TWA) for asbestos exposure. As previously stated, once this level is met or exceeded, a number of required work practices must be implemented, including air monitoring, regulated work areas, engineering and work practice controls, respiratory protection, protective clothing, hygiene facilities and practices, training, medical surveillance and record keeping.

As a means for compliance to those regulations, 8 hour TWA air sampling shall be conducted during any small-scale, short duration maintenance activities involving ACM. It is recommended that air monitoring be performed as follows:

- i. Personal samples should be collected at the breathing zone of employee(s) performing a particular asbestos related activity.
- ii. It is also recommended that area samples be collected in the vicinity of the maintenance activity to determine the expected level of air contamination in the surrounding areas as a result of the activity.

All air monitoring will be done in accordance with OSHA (29 CFR 1910.1001 and 1926.1101) and EPA's 40 CFR Part 763.121. Sample collection and analysis shall be conducted according to NIOSH methodology. The samples will be taken to determine the 8 hour time weighted average concentrations and ceiling concentrations of asbestos fibers.

Results of all analysis will be posted in the buildings maintenance office and in the office of the LEA's asbestos coordinator. The air analysis report shall be included in the building's management plan as part of the permanent record.

In addition to the above, it should be noted that in response to a U.S. Court of Appeals order, OSHA issued a short term permissible exposure limit designed to protect workers from "bursts" of exposure to asbestos. The limit, referred to as the Excursion Limit (EL), was announced on September 14, 1988 (53 FR 35610) and went into effect on October 14, 1988. This limit amended OSHA's asbestos regulations for general industry and construction industry. The EL limits the exposure of unprotected workers to one fiber per cubic centimeter (f/cc) averaged over a period of 30 minutes. It is advisable that a copy of this ruling be obtained and added to the permanent record.

4.6 CLEANING PROCEDURES



Cleaning procedures described herein describe semiannual cleaning required under AHERA in any area where damaged ACM and/or asbestos containing debris has been identified. All cleaning must conform with requirements set forth in NYS Industrial Code Rule 56.

No initial cleaning records were identified by the AHERA inspector during the review of the original management plan. Initial cleaning requirements under 40 CFR Part 763.91(c) must be met and the appropriate records kept with the management plan.

A. SURFACING MATERIALS

ACM that has been sprayed or troweled onto ceilings and walls are often the main source of airborne asbestos fibers in a building. Areas covered by surfacing ACM tend to be large and, if the material is friable, fibers are gradually released as it ages. Spray any debris found near surfacing ACM with amended water and place the debris in 6 mil polyethylene bags using a wet cloth and pan. Rinse the pan into the bag. Report the presence of debris immediately to the LEA. HEPA vacuum all carpets; no normal vacuums are allowed. Dispose of all debris, filters, mop heads, and cloths in 6 mil polyethylene bags according to EPA regulations for disposal of asbestos waste.

B. THERMAL SYSTEM INSULATION

Cleaning procedures shall be performed in an expedient manner and thereafter on a semiannual basis for all areas where damaged thermal ACM has been located within the building. Once this damage has been abated, the asbestos coordinator shall ensure that the material remains intact. If further deterioration or delamination exists, the findings can be documented during the periodic surveillance and the appropriate response actions shall then be implemented.

C. MISCELLANEOUS MATERIALS

Miscellaneous ACM such as floor tiles, transite board and asbestos containing cement are non-friable forms of asbestos. The potential for fiber release episodes are therefore relatively low. Because of their low friability, a cleaning program is not suggested for these materials unless they have been damaged. For all other miscellaneous materials the cleaning procedures of surfacing materials should be followed.

4.7 OPERATIONS, MAINTENANCE AND REPAIR PROCEDURES

The AHERA regulation defines those activities which LEA employees are allowed to conduct as "small scale, short duration." The definition is ambiguous but can be interpreted as: a) removal of small quantities of ACM only if required in the performance of other maintenance and not intended as asbestos abatement; b) removal of thermal insulation in amounts not greater than that which can be contained in a single glove bag; and c) minor patching and repair to surfacing or thermal insulation which does not include removal. New York State Industrial Code Rule 56 clearly defines asbestos related activities, how they to be performed, and the worker qualifications required to perform them. The requirements under this regulation represent the most stringent applicable regulations. Therefore, this regulation shall be adhered to strictly during applicable operations.



A. ROUTINE MAINTENANCE

All maintenance and renovation activities must be approved by the LEA to ensure that ACBM is not inadvertently disturbed. This includes work that is performed by in-house personnel, such as maintenance of mechanical systems, as well as by outside vendors, such as telephone, computer or HVAC contractors. All outside contractors/short-term workers who may come in contact with ACM must check the Management Plan for information regarding the locations of known, suspected & assumed ACBM.

Routine activities which directly impact ACBM are prohibited. These include hanging, taping or tacking objects from ceiling acoustical plaster; storing tools and materials near or against thermal insulation; and sanding or drilling asbestos floor tiles.

Routine activities which may disturb ACBM must be strictly controlled to prevent fiber release. Changing light bulbs in an acoustical plaster ceiling, working on equipment near surfacing or thermal insulation, or replacing floor tiles should be done during off hours by trained staff with appropriate equipment.

All maintenance activities which will disturb ACBM, such as replacing insulation valves or cleaning out insulated flue or boiler equipment, must be performed under the procedures described in federal, state and local regulations. **DRY SWEEPING ACBM DEBRIS IS STRICTLY PROHIBITED.**

B. PERIODIC SURVEILLANCE

At least once every six months after implementing the management plan, the LEA shall conduct periodic surveillance in each functional space that contains ACBM. Inspections of ACBM must be performed as part of the on-going O&M program in order to comply with AHERA. Each person performing periodic surveillance shall:

- i. Visually inspect all areas identified in the management as ACBM or assumed ACBM.
- ii. Record the date of the surveillance, the inspector's name and any changes in the condition of the ACBM, i.e. water damage, debris, changes in the patterns of use, air erosion or delamination. This information will then be incorporated into AHERA 3 Year Re-Inspection Form, which is located in Appendix 4.
- iii. Maintenance personnel should inform the asbestos coordinator when debris has been cleaned up. The cleaning procedures shall be conducted according to section 7.6 of this report and all other applicable regulations.

The maintenance staff should make routine visual inspections of all surfacing materials, thermal insulation and miscellaneous materials. If the inspections reveal a change in the condition of the ACBM the staff shall report their findings to the LEA. The following techniques shall be used:

1. Periodic Surveillance for Surfacing Materials:



- All material is free from any water damage, discoloration or contact damage.
- Inspect vents for signs of air erosion.
- Check horizontal surfaces for visible debris.

2. Periodic Surveillance for Thermal System Materials:

- All wrapping, lagging and protective jackets are intact.
- All material is free from punctures, rips, tears, gashes, gouges and/or water damage. Seams and exposed ends of TSI sections are particularly susceptible to physical damage and should be referred to within the surveillance report.
- Any debris from damaged TSI must be picked up immediately following procedures identified in section 7.6 of this report and all applicable regulations.

3. Periodic Surveillance for Miscellaneous Materials:

- All material is free from contact damage, discoloration or water damage.
- Check horizontal surfaces for visible debris.

Once every three years, or until all of the ACBM is removed, an AHERA accredited inspector must re-inspect the school for the presence of ACBM.

The periodic surveillance and re-inspection shall follow the schedule outlined below:

1st	_	January 2023	2nd	_	July 2023
3rd	_	January 2024	4th	_	July 2024
5th	_	January 2025	Re-inspection	_	July 2025

C. EMERGENCY EVENTS

Minor Fiber Release Episode

The EPA defines a minor fiber release episode as visible emissions or debris from disturbed or damaged ACM which dislodges less than three square feet of surfacing ACM or three linear feet of thermal insulation. When a minor fiber release episode occurs, the asbestos coordinator shall direct work as follows:

1. Restrict access and isolate area during the cleaning process.
2. Apply amended water to the debris, mist air in the area and remove and dispose of the ACM according to federal, state and local regulations.
3. Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos fibers.
4. Remove, repair, encapsulate or enclose the ACM fiber release source as per federal, state and local regulations.



5. Dispose of all asbestos waste according to EPA and other applicable regulations.
6. Document the fiber release episode as part of the management plan.

Major Fiber Release Episode

The EPA defines a major fiber release episode as visible emissions or debris from disturbed or damaged ACM which dislodges greater than three square feet of surfacing ACM or three linear feet of thermal ACM. When a major fiber release episode occurs, the asbestos coordinator shall:

1. Restrict and isolate the affected areas and post warning signs.
2. Use trained and protected workers to lock out HVAC systems to the area.
3. Notify the appropriate regulatory agency as required under NESHAPS.
4. Execute appropriate response actions with accredited abatement designers and contractors.
5. Document the fiber release episode as part of the management plan.

D. REPAIR PROCEDURES

Repair Procedures for Surfacing ACM

All personnel who disturb ACBM must be provided with the proper protective equipment. This shall include, but is not limited to, disposable protective overalls, HEPA vacuums, respirators, high quality duct tape, 6 mil fire retardant polyethylene sheeting, glovebags, spray adhesive, "DANGER ASBESTOS" signs, surfactants, encapsulants, asbestos repair materials, and other appropriate tools.

To repair damaged surfacing materials, follow these procedures:

1. Repair work must be performed by qualified, trained individuals according to all federal, state and local regulations.
2. Personal protective equipment and respiratory protection must be worn as per all applicable regulations.
3. "Caution hazard" signs shall be posted at all work entrances and along perimeter of the work site. If necessary, rope off the area with barrier tape.
4. All vents, lighting fixtures, desks and equipment in the proximity of the work area shall be covered with 6 mil fire retardant polyethylene sheeting.
5. Lock out all ventilation heating and cooling systems to avoid fiber release to areas of the building which are unaffected.



6. Mist air at the location where the repair will be performed.
7. Pick up and dispose of any debris found on surfaces.
8. Wet wipe and HEPA vacuum all horizontal and vertical surfaces potentially contaminated with asbestos fibers. Take down two layers of 6 mil polyethylene sheeting on horizontal and vertical surfaces in the area.
9. After all affected surfaces are free from asbestos debris, lay down two (2) layers of 6 mil fire retardant polyethylene sheeting on horizontal and vertical surfaces in the area.
10. Gently mist the damaged material with amended water and carefully remove loose pieces of ACM.
11. If necessary, fill the damaged areas with a non-asbestos containing plaster or other patch material that will adhere to both the substrate and the adjoining ACM.
12. Encapsulate using a low pressure sprayer.
13. When the repair is complete, remove polyethylene sheeting and dispose of as asbestos contaminated waste.
14. Re-clean the area using wet wiping and HEPA vacuuming techniques.
15. Dispose of cloths, respirator filter cartridges, coveralls, etc. as asbestos contaminated waste.
16. Record activities as part of the management plan and repeat periodic surveillance and cleaning as part of the on going O&M program.

Patch and Repair Techniques for Thermal System Insulation

The following procedures shall be executed:

1. Repair work shall be performed by individuals qualified and trained according to federal, state and local regulations.
2. Personal protective equipment and respiratory protection must be worn as per all applicable regulations.
3. "Caution hazard" signs shall be posted at all work entrances and along perimeter of the work site. If necessary, rope off the area with barrier tape.
4. All vents, lighting fixtures, desks and equipment in the proximity of the work area shall be covered with 6 mil fire retardant polyethylene sheeting.



5. Lock out all ventilation heating and cooling systems to avoid fiber release to areas of the building which are unaffected.
6. Wet wipe and HEPA vacuum all surfaces in the area potentially contaminated with asbestos fibers.
7. Horizontal and vertical surfaces in the vicinity shall be covered with two layers of 6 mil fire retardant polyethylene sheeting.
8. Gently mist the damaged area with amended water.
9. Remove all loose and damaged debris.
10. HEPA vacuum the substrate and surface area.
11. Repair surfaces with an appropriate patching material.
12. Encapsulate the repaired area with an approved encapsulant.
13. Apply fiberglass cloth to wet encapsulant by wrapping around the surface, covering twice with overlapping seams. Smooth out all areas of cloth.
14. Re-encapsulate fiberglass cloth. Use thick, even coats.
15. Wet wipe or HEPA vacuum affected areas.
16. Double bag and dispose of asbestos waste and all debris contaminated plastic, cloths, respirator filter cartridges and disposable clothing.
17. Record all abatement/patch and repair activities as part of the management plan.

E. MINOR THERMAL INSULATION REMOVAL BY GLOVEBAG METHODS

The glovebag method is for removal of damaged insulation on pipes and pipe fittings. A minimum of two people is required to perform a glovebag removal. Repair work shall be performed by qualified individuals, trained according to all federal, state and local regulations. Personal protective equipment and respiratory protection must be worn as per all applicable regulations.

1. This method shall be optional only in areas not scheduled for gross removal operations.
2. Glovebags may only be used on piping and after approval from the asbestos coordinator.
3. The workers shall be required to protect equipment by cleaning and wrapping it with polyethylene sheeting, tape and/or adhesive.



4. Workers shall clean and protect as necessary all floors and walls within the work area with 6 mil fire retardant polyethylene sheeting, tape and/or adhesives. As a minimum, extend polyethylene one foot horizontally in all directions for each foot of vertical height from the floor to the material.
5. If fiber levels found on personal samples during glovebag removal exceed 0.01 f/cc and methods to reduce the levels prove futile, the workers shall remove the insulation according to more stringent requirements such as NYS Industrial Code Rule 56 and other applicable guidelines.
6. Using approved glovebags in strict accordance with applicable regulations and the manufacturer's instructions, workers in full protective body clothing and appropriate respirators shall begin removal of pipe insulation as per the following minimum procedures. In case of conflict the more stringent provisions of the applicable regulations shall apply.
7. Cut the sides of the glovebag to fit the size of the pipe to be worked on and insert the needed tools into the attached pocket.
8. Seal the glovebag by folding the open edges, then staple and tape. Provide any additional precautions necessary to support the weight of the debris.
9. Tightly seal the edges of the glovebag around the working area with tape. Slice open the side port to allow entry of the wetting tube and HEPA vacuum hose. Insert the nozzle from the portable sprayer. Seal around with tape and thoroughly wet the area to be removed. Insert the vacuum hose and seal accordingly.
10. Before removal work procedures the glovebag must pass a smoke test as follows:
 - i. Aspirate the contents of a smoke tube through the water port access of the bag.
 - ii. After twist sealing the access port the bag shall be squeezed gently and checked for any leakage points so they can be taped air tight.
 - iii. Replace the spray nozzle in the bag and seal with tape.
11. Upon approval of the glovebag attachment, insert arms into the armholes and gloves and wet the material to be removed. Proceed to remove the elbow, valve fitting or pipe. At locations where insulation rests directly on pipe hangers or supports, the worker shall re-support the pipe by shimming with wood blocks or other suitable materials. Continue wetting the material as required. Once all insulation materials have been removed, thoroughly wet the pipe and remaining insulation and wash down the inside of the glovebag.
12. Scrub or brush any visible, remaining insulation material from the pipe or fitting. Rinse and wet pipe again. Seal the exposed insulation edges with the proper encapsulant. When the job is complete, remove the spray nozzle and turn on the HEPA vacuum to remove air from the bag.



13. When the air is removed from the bag, squeeze the bag tightly as close to the top as possible. Twist and tape to keep the asbestos material safely at the bottom of the bag. Turn off the HEPA vacuum. Remove the hose from the side port and seal the side port with tape.
14. Place a 6 mil plastic bag around the glovebag. Cut and remove the glovebag from the pipe. Twist and seal. Place it into another plastic bag and seal. Move bags to holding area or the disposal storage area.
15. Mist surface of protective polyethylene and carefully fold inward. Proceed to HEPA vacuum the work area for any residual materials. Reseal the exposed edges and piping with the proper encapsulant if needed.
16. The testing shall be in accordance to AHERA and other federal, state and local regulations.
17. Reestablish objects moved to temporary locations in the course of work to their proper positions.

F. REPAIR OF NONFRIABLE MISCELLANEOUS ASBESTOS CONTAINING MATERIALS

If a situation such as a damaged floor tile exists, the best possible response action is replacement. If this cannot be done, the following is recommended:

1. Repair work must be performed by qualified individuals, trained according to all federal, state and local regulations.
2. Personal protective equipment and respiratory protection must be worn as per all applicable regulations.
3. Post hazard signs and restrict access to the area.
4. Prohibit access of unauthorized personnel.
5. Clean up debris from surfaces via wet wipe/HEPA vacuum methods. No drilling, cutting with power tools or sanding is permitted.
6. Cut all floor tiles with a utility knife.
7. Fill all holes and cracks with an equivalent non-ACM and/or plaster. Apply a thick coating of bridging encapsulant at full strength. This form of encapsulant differs from a penetrating encapsulant in that it forms a surface layer of "skin" over non-friable, impenetrable forms of asbestos. Allow to dry and apply a second coat.
8. Record activities as part of the management plan and repeat periodic cleaning and surveillance as part of the on-going O&M program.

4.8 WASTE DISPOSAL



All ACM waste shall be double bagged in 6 mil polyethylene plastic bags. These bags shall be preprinted as per OSHA and Federal DOT requirements to show they contain ACM. Asbestos waste shall be kept in a secured and controlled location such as a routine and maintenance area of the facility. Filled bags of waste are carried to this area and placed in sealable metal or fiber 55 gallon drums, labeled as per applicable regulations. When the drums are full, they shall be sealed, labeled and transported to a landfill site approved to accept ACM waste by EPA and all other federal, state and local requirements.

The waste containers shall be transported to the landfill site in a covered, lockable vehicle. All transported containers shall be accompanied by a proper chain of custody (manifest) form that details the origin of the material, date and quantities of transport, types of containers and their destinations. If transported by a third party hauler, information on the form is signed at each transfer point and, after final transport to the landfill site, a copy of the form shall be maintained in the management plan.

4.9 WARNING LABELS

Warning labels shall be attached immediately adjacent to any friable and non-friable ACBM located in routine maintenance areas as per 40 CFR Part 763.95. The labels must be of a size, print and color easily visible to persons entering an area containing ACBM. The labels will read:

**CAUTION ASBESTOS, HAZARDOUS
DO NOT DISTURB
WITHOUT PROPER TRAINING AND EQUIPMENT**

Warning labels and signs must remain in place until the asbestos containing material(s) is/are removed.

4.10 NOTIFICATIONS OF AFFECTED PARTIES

AHERA requires that steps be taken to inform workers and building occupants, or their legal guardians, about inspections, re-inspections, response actions, and post-response action activities, including periodic re-inspection and surveillance activities which are planned or in progress. At a minimum, these notifications must occur on a yearly basis following the initial notification. Notifications of the various parties can be accomplished in two ways:

1. Distributing notices; and
2. Holding awareness and/or informational seminars.

The distribution of notices is an effective means of alerting occupants about the presence of asbestos. Memorandums or letters tailored to specific parties provide excellent documentation along with verification that the notification was furnished. The AHERA Management Plan must be made available for review by the public, including but not limited to parents, teachers and other school personnel and their representatives, without cost or restriction. The school, however, may charge a reasonable fee to make copies.



Awareness and/or information seminars can follow written notification. These serve to expand upon the information given in the written form. They also serve as a question and answer period for anyone with questions regarding asbestos. Copies of notification memos, attendance lists at any awareness seminars, hand-outs provided, and the name of the person or persons providing the seminars should be filed.

4.11 SUGGESTED OPERATIONS AND MAINTENANCE EQUIPMENT

1. Disposable coveralls
2. Rubber or latex gloves
3. Half face, dual cartridge negative pressure respirators with NIOSH and MSHA approved cartridges
4. Safety goggles
5. Surfactant
6. Misting spray bottle
7. Misting spray tank
8. Dust mop/broom
9. Polyethylene sheeting (6 mil)
10. Asbestos disposal bags (6 mil)
11. HEPA vacuum with attachments
12. Duct tape
13. Hand tools
14. Warning signs and labels
15. Scrim cloth and/or foil tape for pipe wrap
16. Encapsulant bridging and penetrating
17. Smoke tube kit
18. Glovebag

4.12 DOCUMENTATION AND RECORD KEEPING

As part of the management plan, the LEA must maintain all records required by AHERA in a central file at the administrators office, which is currently the district office, located at 5 Homestead Lane, White Plains, New York, as well as in individual buildings as per 40 CFR Part 763.94. These records shall include documentation of all ACBM locations, conditions, response actions and activities in addition to training, medical records and personnel updates.

A list of items to be included in this file is:

1. All abatement activity and related documents and test results until (1) the entire homogeneous area has been removed and (2) for at least three years after the next re-inspection. This information must be comprehensive and complete.
2. For each response action or preventive maintenance procedure: (a) detailed description of work, (b) methods used, (c) location of action, (d) reasons for selecting action, (e) start and completion dates, (f) names and addresses of all contractors used, their state of accreditation



- and accreditation numbers, (g) name and location or storage or disposal site for ACBM which was removed, (h) names and signatures of persons collecting air samples, (i) locations where air samples were collected, (j) date of sample collection, (k) name/address of lab analyzing the samples, (l) date of analysis, (m) results of analysis, (n) method of analysis, (o) name/signature of analyst, and (p) statement that the lab meets requirements.
3. Documentation of the LEA's employee training program with: (a) an updated list of personnel involved, (b) date and location of the training, and (c) number of training hours completed.
 4. Periodic surveillance results including: (a) the inspector's name, (b) date of the surveillance, (c) findings of the surveillance, and (d) remedial action taken, if any.
 5. For each O&M procedure: (a) the person's name who did the O&M, (b) start and completion dates, (c) locations of the activity, (d) description of the activity/ preventative measures, and (e) ACBM storage or disposal site.
 6. For each fiber release episode under 40 CFR Part 763.91(f): (a) date and location of the episode, (b) method of repair, (c) preventative measure or response action taken, (d) the name of each individual involved and their activity and, if applicable, (e) the storage or disposal site for the ACM removed.
 7. For each major asbestos activity performed: (a) name, signature, State of accreditation, and accreditation number of each person performing the activity, (b) locations of the activity, (c) description of the activity/preventative measure, and, if applicable, (d) the storage or disposal site for the ACM removed.

5.0 LEA DESIGNATED PERSON

As stated in the AHERA regulations, each LEA must designate a competent person to be responsible for implementing the Management Plan for each school. For the White Plains City School District, the designated person as of the start of this inspection is:

Frank Stefanelli or Xavier Hernandez-Delgado
Director of Facilities
508 North Street
White Plains, NY 10605

APPENDIX 1:

SITE PLANS

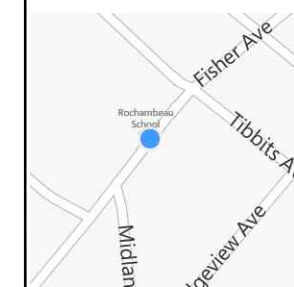


AHERA SITE PLAN



WSP USA SOLUTIONS, INC.
500 Summit Lake Drive, Suite 450
Valhalla, NY 10595
TEL 914.742.1120

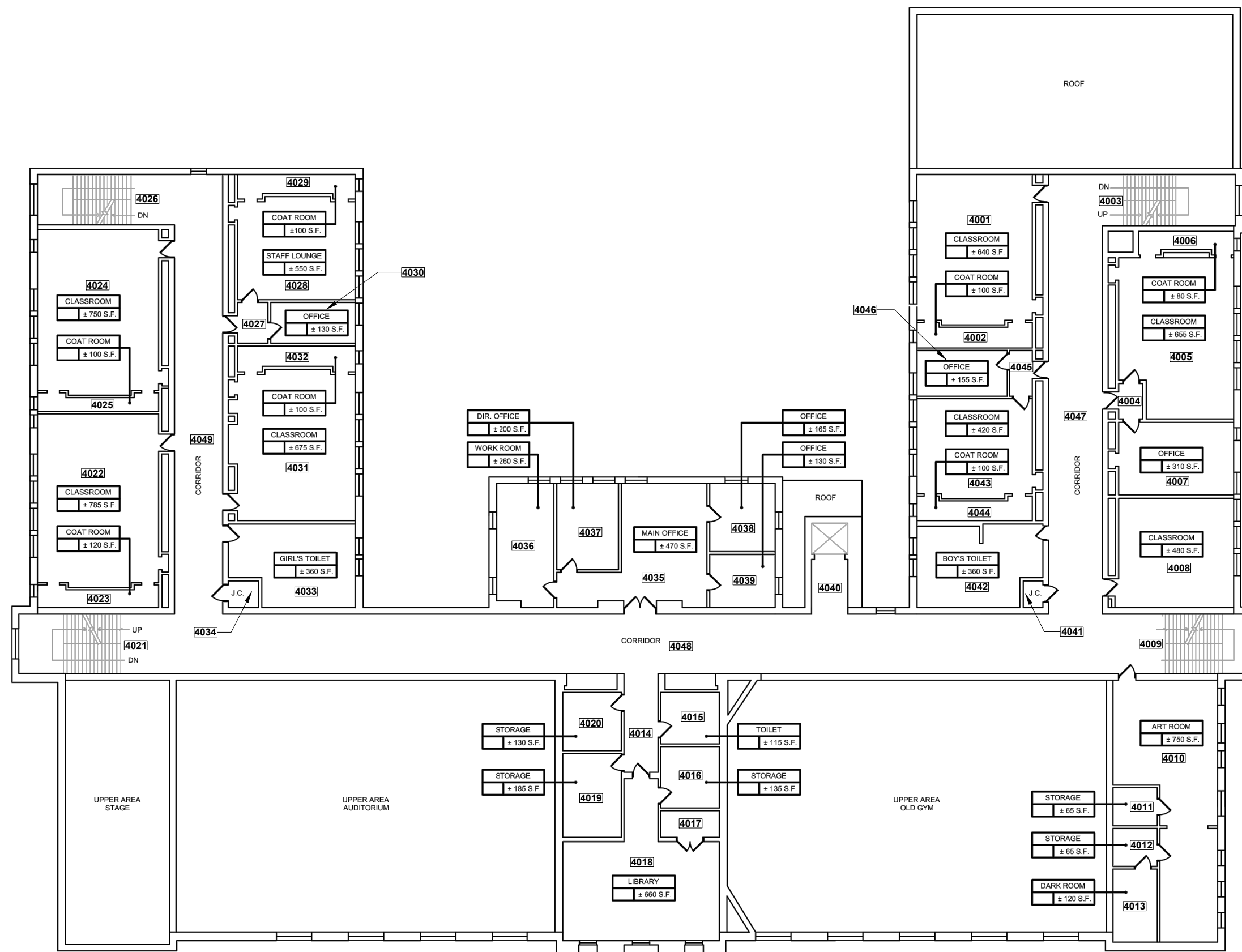
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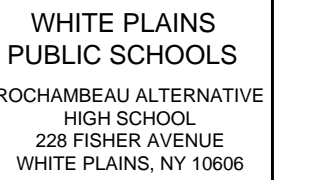
No.	Date	Issue
Sheet Title		

SITE PLAN
SECOND FLOOR

Job No. 31403469.039	Sheet No.
Date: JULY 2022	<div>SP-004</div> <div>4 of 5</div>
Drawn by: J. PEREZ	
Checked by: A. SMOLYAR	

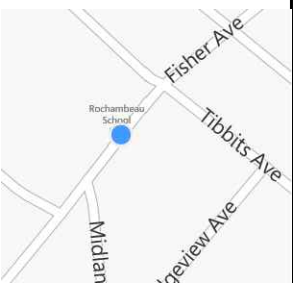


1 SECOND FLOOR PLAN
SCALE: NTS



WSP

WSP USA SOLUTIONS, INC.
500 Summit Lake Drive, Suite 450
Valhalla, NY 10595
TEL. 914.742.1120

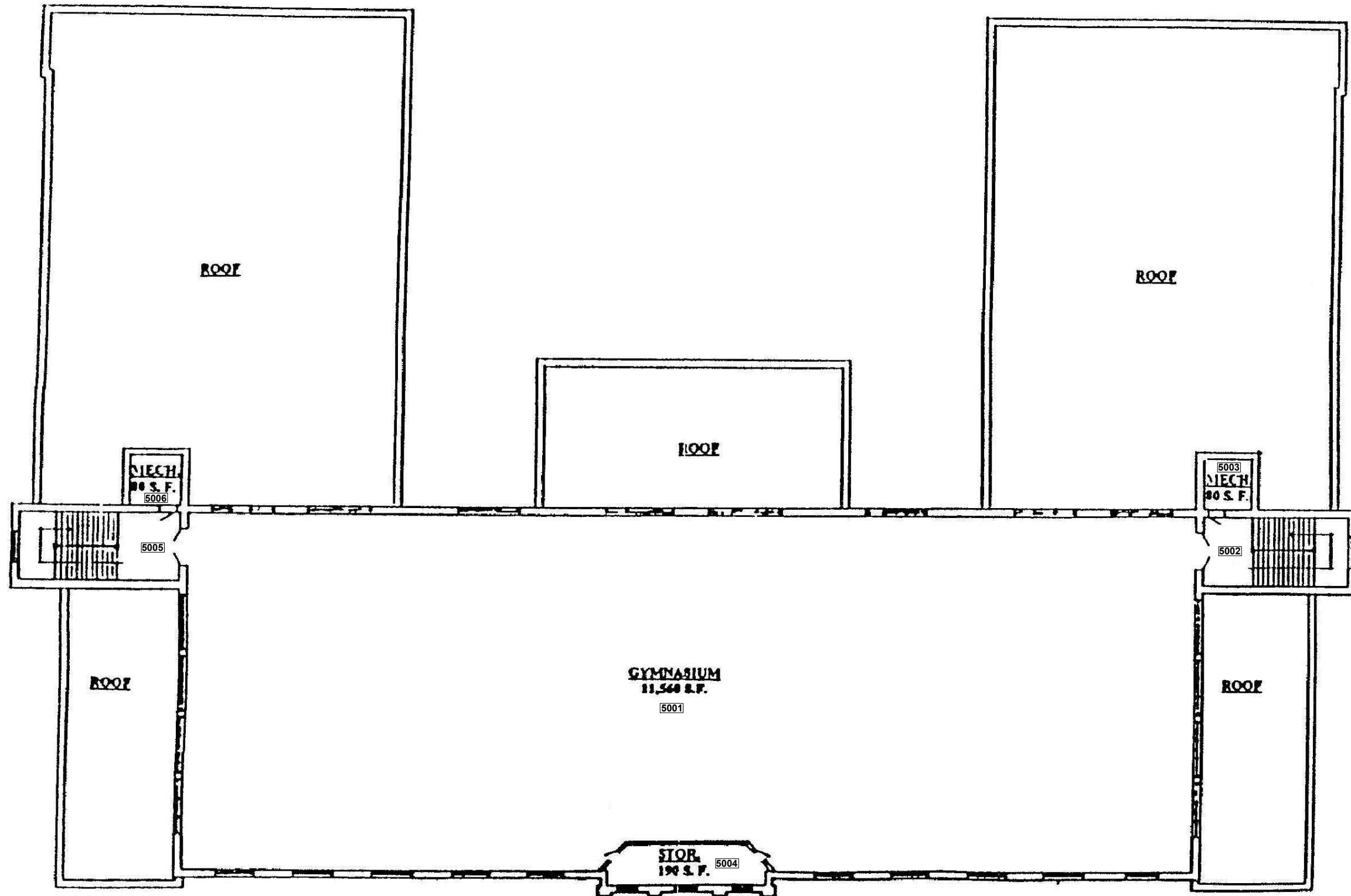
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SITE PLAN
THIRD FLOOR

Date:	JULY 2022
Drawn by:	J. PEREZ
Checked by:	A. SMOLYAR

SP-005

5 of 5



1 THIRD FLOOR PLAN
SCALE: NTS

SCALE: NTS

APPENDIX 2:
HOMOGENEOUS AREA SHEETS



500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

HOMOGENEOUS AREA SHEET

Client: White Plains Public Schools

Project Site: Rochambeau Elementary School

Inspector(s): Zachary Collins/Jordan Wong

Man. Planner(s): Alexander Smolyar

Project #: 31403469.039

HA #	Homogenous Area Description	Material Type	ACM	Friable
01	9"x9" Floor Tile/Mastic	M	YES	NO
02	Wall Plaster	S	YES	YES
03	Wire Insulation	M	YES	YES
04	2'x4' Large Gouged Ceiling Tile, White	M	NO	NO
05	2'x4' Fissured Ceiling Tile, White	M	NO	NO
06	1'x1' Gouged Ceiling Tile, Gray	M	NO	NO
07	2'x4' Gouged Ceiling Tile, White	M	NO	NO
08	2'x4' Stripe Design Ceiling Tile, White	M	NO	NO
09	2'x4' Fissured/Pinhole Ceiling Tile, White	M	NO	NO
10	Ceiling Plaster, White Coat	S	NO	YES
11	Ceiling Plaster, Brown Coat	S	NO	YES
12	Wall Plaster, White Coat	S	NO	YES
13	Wall Plaster, Brown Coat	S	NO	YES
14	Ceiling Deck (gymnasium)	M	NO	YES
15	1'x1' Ceiling Tile, Textured	M	NO	NO
16	1'x1' Ceiling Tile, Textured, Mastic	M	NO	NO
17	Terrazzo Flooring	M	NO	YES
18	Interior Brick Mortar	M	NO	YES
19	2'x4' Ceiling Tile, Patterned/Pinhole (old gymnasium)	M	NO	NO
20	1'x1' Ceiling Tile, Pinhole (old gymnasium)	M	NO	NO
21	1'x1' Ceiling Tile, Pinhole, Mastic (old gymnasium)	M	NO	NO
22	Brick Mortar (old gymnasium)	M	NO	YES
23	Interior Window Frame Caulk, Grey	M	NO	NO



500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

HOMOGENEOUS AREA SHEET

Client: White Plains Public Schools

Project Site: Rochambeau Elementary School

Inspector(s): Zachary Collins/Jordan Wong

Man. Planner(s): Alexander Smolyar

Project #: 31403469.039

HA #	Homogenous Area Description	Material Type	ACM	Friable
24	Interior Window Frame Caulk, Beige (to A/C units)	M	NO	NO
25	Wall Plaster, White Coat (Auditorium Stage)	S	NO	YES
26	Wall Plaster, Brown Coat (Auditorium Stage)	S	NO	YES
27	Pipe Joint to Fiberglass Pipe Insulation	TSI	NO	YES
28	Interior Brick Mortar (Foundation Brick)	M	NO	YES
29	Pipe Gasket	M	NO	NO
30	1'x1' Ceiling Tile, Pinhole (Cafeteria)	M	NO	NO
31	1'x1' Ceiling Tile, Pinhole, Mastic (Cafeteria)	M	NO	NO
32	1'x1' Ceiling Tile, Spline	M	NO	NO
33	CMU Mortar	M	NO	YES
34	Aircell Pipe Insulation at Radiator	TSI	YES	YES
35	Pipe Canvas Wrap at Radiator	TSI	YES	NO
36	Radiator Insulation	TSI	YES	YES
37	Drywall	M	NO	NO
38	Glue Dots assoc. with 1'x1' Pinhole Ceiling Tiles (2 nd Floor Rooms & Vestibule)	M	NO	NO
39	Mastic. Assoc. with 4" Black Cove Base (2 nd Floor Rooms & Vestibule)	M	NO	NO

TSI = Thermal System Insulation

S = Surfacing

M = Miscellaneous

APPENDIX 3:
HAZARDOUS ASSESSMENT FORM



**SUMMARY OF SPACE 2022
AHERA 3 YEAR RE-INSPECTION REPORT
MANAGEMENT PLAN UPDATE**

**WHITE PLAINS PUBLIC SCHOOL
ROCHAMBEAU ELEMENTARY SCHOOL
228 FISHER AVENUE, WHITE PLAINS, NY 10606**

Space ID	Description / Common Name	HA	HA Description	Quantity	Assessment	Response Action			Comment
						Remove	Repair	O&M	
1001	Classroom A	1	9"x9" Floor Tile/Mastic	815 SF	X	-	-	815 SF	Under Non-ACM 12"x12" Floor Tile
1005	Vestibule	1	9"x9" Floor Tile/Mastic	70 SF	X	-	-	70 SF	Under Non-ACM 12"x12" Floor Tile
1022	Dark Room	1	9"x9" Floor Tile/Mastic	400 SF	X	400 SF	-	-	9"x9" Cream (Significantly Damage)
2011	Hallway	1	9"x9" Floor Tile/Mastic	320 SF	X	-	-	320 SF	Under Non-ACM 12"x12" Floor Tile
2012	Classroom 107B	1	9"x9" Floor Tile/Mastic	425 SF	X	-	-	425 SF	Under Non-ACM 12"x12" Floor Tile
2013	Classroom 107A	1	9"x9" Floor Tile/Mastic	345 SF	X	-	-	345 SF	Under Non-ACM 12"x12" Floor Tile
2027	Walnut Lounge	1	9"x9" Floor Tile/Mastic	500 SF	X	-	-	500 SF	9"x9" Tan w/Brown Specs
3034	Auditorium	2	Wall Plaster	6,997 SF	7	-	-	6,997 SF	3 SF Abated 2019
3035	Stage	3	Wire Insulation	15 LF	7	-	-	15 LF	Unable to Locate Wire Insulation
3041	Stairway next to Room 225	34	Aircell Pipe Insulation at Radiator	3 LF	7	-	-	3 LF	
		35	Pipe Canvas Wrap at Radiator		X	-	-		
		36	Radiator Insulation	6 SF	7	-	-	6 SF	

ASSESSMENT CATEGORIES

- 1. = Damaged or Significantly Damaged TSI ACBM
- 2. = Damaged Friable Surfacing ACBM
- 3. = Significantly Damaged Friable Surfacing ACBM
- 4. = Damaged or Significantly Damaged Friable Miscellaneous ACBM
- 5. = ACBM with Potential for Damage
- 6. = ACBM with Potential for Significant Damage
- 7. = Any Remaining Friable ACBM or Friable Suspect ACBM
- X. = Not Applicable (Material is Nonfriable Surfacing or Miscellaneous Material)

HAZARD RESPONSE TABLE

RESPONSE ACTION #	HAZARD RESPONSE ACTION	ASBESTOS MATERIAL Yes or No	FRIABLE Yes or No	DAMAGED Yes or No	POTENTIAL DISTURBANCE High, Moderate, Low	AIR FLOW Yes or No	ETC Rating	CLASS OF WORK
1	REMOVED ASAP	YES	YES	YES SIGNIFICANT	N/A	N/A	POOR	CLASS I
2	REPAIR, REMOVE, REDUCE DISTURBANCE ASAP	YES	YES	YES	HIGH	N/A	POOR	CLASS I or II
3	REPAIR, REMOVE, REDUCE DISTURBANCE ASAP	YES	YES	YES	MODERATE	YES	POOR	CLASS I or II
4	REPAIR, THEN O&M	YES	YES	YES	MODERATE	NO	POOR	CLASS I, II or III
5	REPAIR, THEN O&M	YES	YES	YES	LOW	YES	POOR	CLASS I, II or III
6	O&M AND THEN SCHEDULE REPAIR	YES	YES	YES	LOW	NO	FAIR	CLASS III or IV
7	REDUCE POTENTIAL FOR DISTURBANCE AND THEN O&M	YES	YES	NO	HIGH	N/A	FAIR	CLASS I, II, III or IV
8	O&M AND THEN REMOVE DISTURBANCE POTENTIAL	YES	YES	NO	MODERATE	N/A	FAIR	CLASS IV
9	O&M	YES	YES	NO	LOW	N/A	GOOD	CLASS IV
10	O&M AND FLOOR CARE/REPAIR	YES	NO	YES	N/A	N/A	FAIR	CLASS III or IV
11	O&M	YES	NO	NO	N/A	N/A	GOOD	CLASS IV

Notes:

N/A = Not Applicable

Damaged Floor Tile - Falls into response action # 10

Significant Damage - Any material with greater than 10 percent overall damage or greater than 25 percent localized damage

Damage - Any material with less than 10 percent overall damage or less than 25 percent localized damage

Air Flow - Area where Plenums, Air Shaft, Elevator Shaft, Ventilation Shaft, etc., create air flow that can cause erosion of materials

APPENDIX 4:

**AHERA 3 YEAR RE-INSPECTION
AND
6 MONTHS PERIODIC
SURVEILLANCE FORM**



500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 1001

Space Description: Classroom A

School District: White Plains Public Schools

School Name: Rochambeau Alternative High School

Re-inspected By: Jordan Wong

Date: July 7, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
01	9"x9" Floor Tile/Mastic	N	815 SF	0	Under Non-ACM 12"x12" Floor Tile

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

¹ Material Condition, Accessibility to Public, Warning Labels, etc.



500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 1005 **Space Description:** Vestibule

School District: White Plains Public Schools

School Name: Rochambeau Alternative High School

Re-inspected By: Jordan Wong **Date:** January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
01	9"x9" Floor Tile/Mastic	N	70 SF	0	Under Non-ACM 12"x12" Floor Tile

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

¹ Material Condition, Accessibility to Public, Warning Labels, etc.



500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 1022 **Space Description:** Dark Room

School District: White Plains Public Schools

School Name: Rochambeau Alternative High School

Re-inspected By: Jordan Wong **Date:** January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
01	9"x9" Floor Tile/Mastic	N	400 SF	200 SF	9"x9" Cream (Significantly Damaged)

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

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Valhalla, New York 10595

**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 2011 **Space Description:** Hallway
School District: White Plains Public Schools
School Name: Rochambeau Alternative High School
Re-inspected By: Jordan Wong **Date:** January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
01	9"x9" Floor Tile/Mastic	N	320 SF	0	Under Non-ACM 12"x12" Floor Tile

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

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500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 2012 **Space Description:** Classroom 107B
School District: White Plains Public Schools
School Name: Rochambeau Alternative High School
Re-inspected By: Jordan Wong **Date:** January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
01	9"x9" Floor Tile/Mastic	N	425 SF	0	Under Non-ACM 12"x12" Floor Tile

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

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500 Summit Lake Drive, Suite 450
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**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 2013

Space Description: Classroom 107A

School District: White Plains Public Schools

School Name: Rochambeau Alternative High School

Re-inspected By: Jordan Wong

Date: January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
01	9"x9" Floor Tile/Mastic	N	345 SF	0	Under Non-ACM 12"x12" Floor Tile

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

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**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 2027 **Space Description:** Walnut Lounge
School District: White Plains Public Schools
School Name: Rochambeau Alternative High School
Re-inspected By: Jordan Wong **Date:** January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
01	9"x9" Floor Tile/Mastic	N	500 SF	0	9"x9" Tan w/Brown Specs

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

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500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 3034

Space Description: Auditorium

School District: White Plains Public Schools

School Name: Rochambeau Alternative High School

Re-inspected By: Jordan Wong

Date: January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
02	Wall Plaster	N	7,000 SF	0	

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

¹ Material Condition, Accessibility to Public, Warning Labels, etc.



500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 3035 **Space Description:** Stage

School District: White Plains Public Schools

School Name: Rochambeau Alternative High School

Re-inspected By: Jordan Wong **Date:** January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
03	Wire Insulation	Y	15 LF	0	Unable to Locate Wire Insulation

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

¹ Material Condition, Accessibility to Public, Warning Labels, etc.



500 Summit Lake Drive, Suite 450
Valhalla, New York 10595

**AHERA 3 YEAR RE-INSPECTION AND
6 MONTHS PERIODIC SURVEILLANCE FORM
ASBESTOS CONTAINING BUILDING MATERIALS**

Space ID: 3041

Space Description: Stairway next to Room 225

School District: White Plains Public Schools

School Name: Rochambeau Alternative High School

Re-inspected By: Jordan Wong

Date: January 24, 2022

Homogeneous Area #	Homogeneous Area Description	Friable (Yes/No)	Quantity	Damage Quantity	Notes ¹
34	Aircell Pipe Insulation at Radiator	Y	3 LF	0	
35	Pipe Canvas Wrap at Radiator	N		0	
36	Radiator Insulation	Y	6 SF	0	

6 MONTHS PERIODIC SURVEILLANCES

No.	Inspection Date	Name of Inspector	Asbestos Containing Building Materials Condition Notes	Fiber Release Episodes (Y/N)
1				
2				
3				
4				
5				

Date Next 3 Year Re-inspection is Required January 2025

¹ Material Condition, Accessibility to Public, Warning Labels, etc.


APPENDIX 5:

**BULK SAMPLE ANALYSIS
RESULTS AND PREVIOUS
SAMPLING DATA**

APPENDIX 6:


**INSPECTORS' AND MANAGEMENT
PLANNERS' CERTIFICATIONS**

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE


 **JORDAN WONG**
CLASS(EXPIRES)
C ATEC(02/23) D INSP(02/23)
H PM (02/23)

CERT# 09-09397
DMV# 564221624

MUST BE CARRIED ON ASBESTOS PROJECTS




STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

 **ZACHARY T COLLINS**
CLASS(EXPIRES)
C ATEC(04/23) H PM (04/23)

CERT# 21-09230
DMV# [REDACTED]

MUST BE CARRIED ON ASBESTOS PROJECTS



STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



ALEXANDER SMOLYAR

CLASS(EXPIRES)

C ATEC(10/22) D INSP(10/22)

H PM (10/22) I PD (10/22)

CERT# 12-07624

DMV# 827923022

MUST BE CARRIED ON ASBESTOS PROJECTS

12 07624 12 07624 12 07624

APPENDIX 7:
SUMMARY OF ABATEMENT
ACTIVITIES

APPENDIX 8:
40 CFR PART 763 (EPA AHERA)

Rochambeau High School

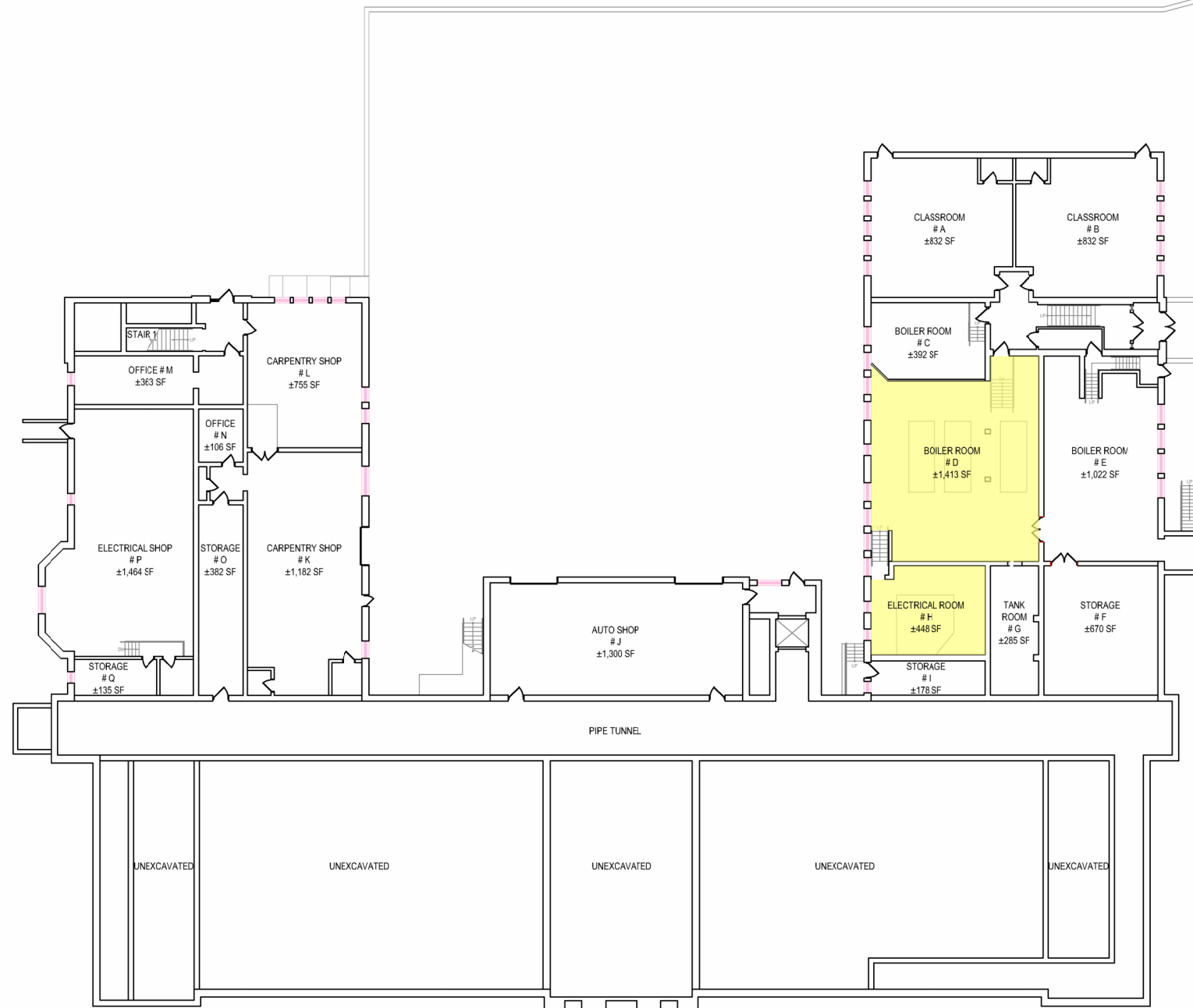
Basement

WHITE PLAINS CITY SCHOOL DISTRICT
SCOPE DRAWINGS PRE-BOND WORK

LEGEND:

- EXISTING TO REMAIN
- PROPOSED RENOVATION (FLOORING LVT/WOOD FLOOR REPAIRS, 1' X 1 GLUED SPLINE CEILINGS, NEW LIGHTING, WINDOWS, DOORS, HARDWARE, CASEWORK, AND WALL PAINTING REPAIR).
- ELECTRICAL AREA OF WORK, FOR PANELS AND SWITCH GEAR REPLACEMENTS, SEE ELECTRICAL PLANS FOR ADDITIONAL INFORMATION.
- WINDOW REPLACEMENT
- DOORS BEING REMOVED

NOTE:
FLOORINGS, CEILINGS, AND WALLS IN ALL OF THE HATCHED AREAS, AS WELL AS THE CAULKING AROUND THE WINDOWS SHALL BE TESTED FOR ASBESTOS, LEAD, PCBs, ETC. AREAS WHERE THERE ARE SUSPENDED CEILINGS, THE CEILINGS/FLOORS DECKS ABOVE TO BE TESTED. FOR UV REMOVALS, TEST FLOORING, WALL CONSTRUCTION AND LOVERS (CAULKING).



BUILDING AREA
Basement Floor : ± 15,200 SF
Ground Floor : ± 29,696 SF
First Floor : ± 29,720 SF
Second Floor : ± 27,500 SF
Third Floor : ± 12,761 SF
Total : ± 114,877 SF

Rochambeau High School

Ground Floor

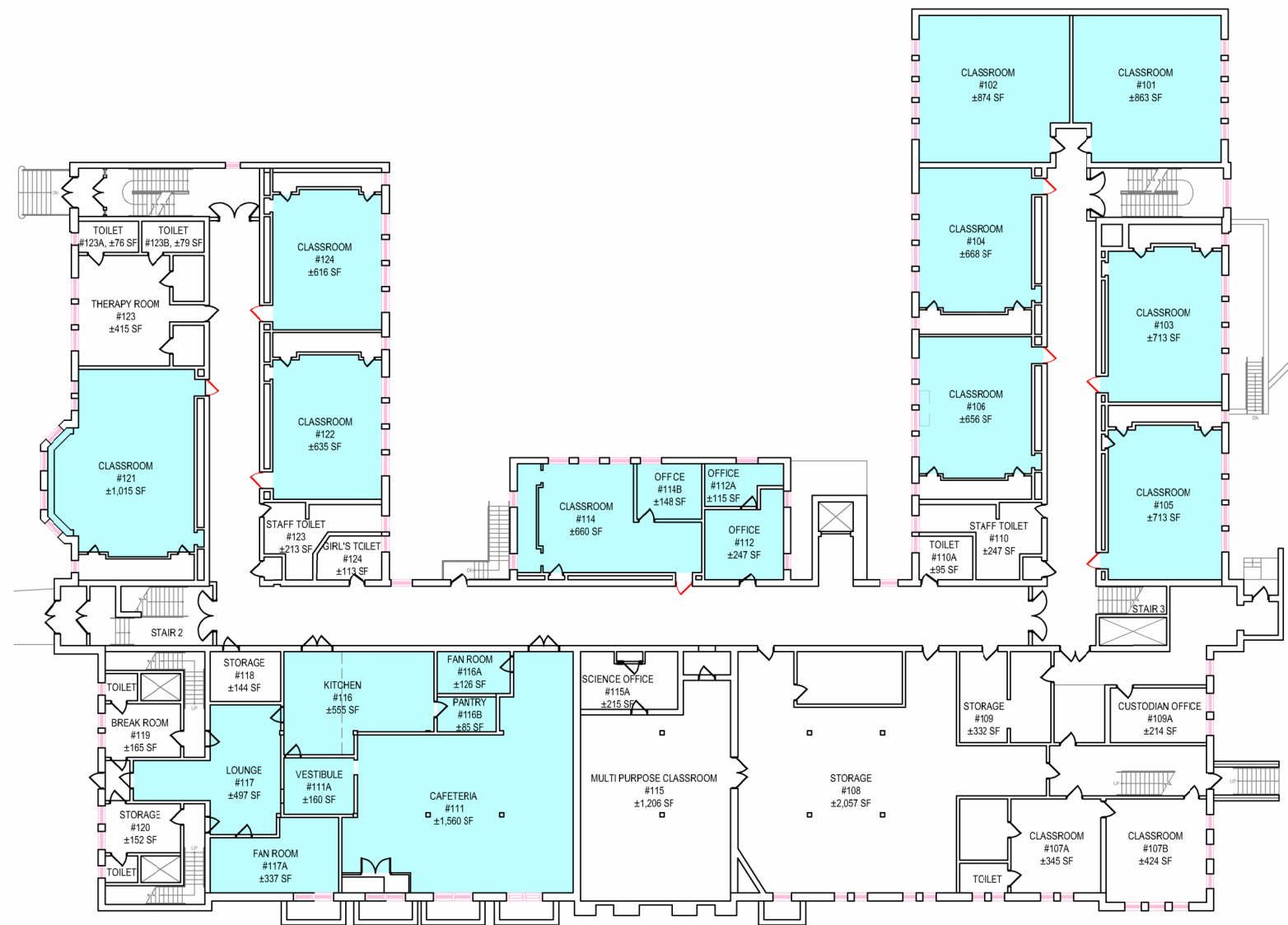
WHITE PLAINS CITY SCHOOL DISTRICT
SCOPE DRAWINGS PRE-BOND WORK

LEGEND:

- EXISTING TO REMAIN
- PROPOSED RENOVATION (FLOORING LVT/WOOD FLOOR REPAIRS, 1' X 1 GLUED SPLINE CEILINGS, NEW LIGHTING, WINDOWS, DOORS, HARDWARE, CASEWORK, AND WALL PAINTING REPAIR).
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Rochambeau High School

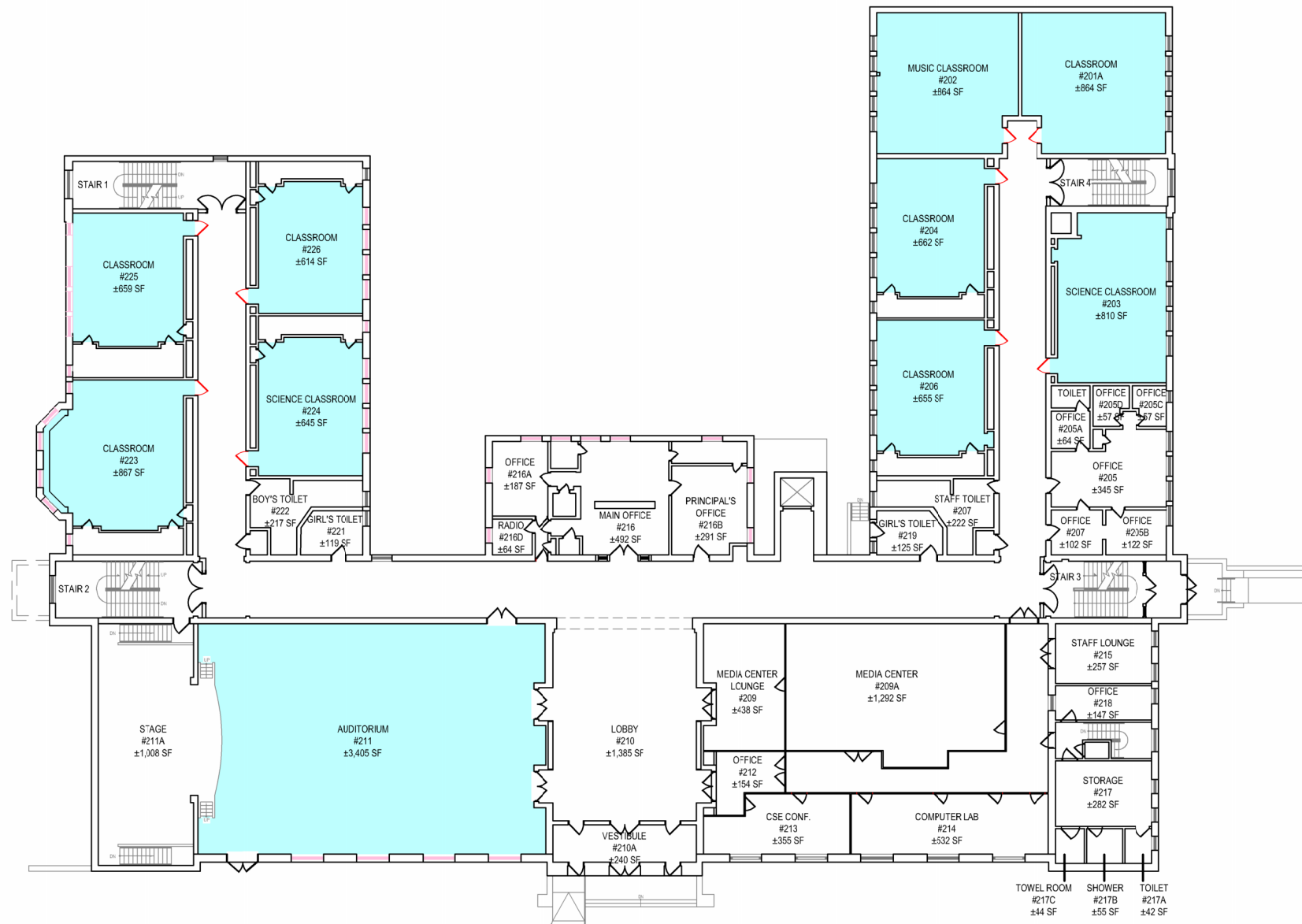
First Floor

WHITE PLAINS CITY SCHOOL DISTRICT
SCOPE DRAWINGS PRE-BOND WORK

LEGEND:

- EXISTING TO REMAIN
- PROPOSED RENOVATION (FLOORING LVT/WOOD FLOOR REPAIRS, 1' X 1 GLUED SPLINE CEILINGS, NEW LIGHTING, WINDOWS, DOORS, HARDWARE, CASEWORK, AND WALL PAINTING REPAIR).
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- WINDOW REPLACEMENT
- DOORS BEING REMOVED

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BUILDING AREA
Basement Floor : ± 15,200 SF
Ground Floor : ± 29,696 SF
First Floor : ± 29,720 SF
Second Floor : ± 27,500 SF
Third Floor : ± 12,761 SF
Total : ± 114,877 SF

Rochambeau High School

Second Floor

WHITE PLAINS CITY SCHOOL DISTRICT
SCOPE DRAWINGS PRE-BOND WORK

LEGEND:

- EXISTING TO REMAIN
- PROPOSED RENOVATION (FLOORING LVT/WOOD FLOOR REPAIRS, 1' X 1 GLUED SPLINE CEILINGS, NEW LIGHTING, WINDOWS, DOORS, HARDWARE, CASEWORK, AND WALL PAINTING REPAIR).
- ELECTRICAL AREA OF WORK, FOR PANELS AND SWITCH GEAR REPLACEMENTS, SEE ELECTRICAL PLANS FOR ADDITIONAL INFORMATION.
- WINDOW REPLACEMENT
- DOORS BEING REMOVED

NOTE:
FLOORINGS, CEILINGS, AND WALLS IN ALL OF THE HATCHED AREAS, AS WELL AS THE CAULKING AROUND THE WINDOWS SHALL BE TESTED FOR ASBESTOS, LEAD, PCBs, ETC. AREAS WHERE THERE ARE SUSPENDED CEILINGS, THE CEILINGS/FLOORS DECKS ABOVE TO BE TESTED. FOR UV REMOVALS, TEST FLOORING, WALL CONSTRUCTION AND LOVERS (CAULKING).



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Total : ± 114,877 SF

Rochambeau High School

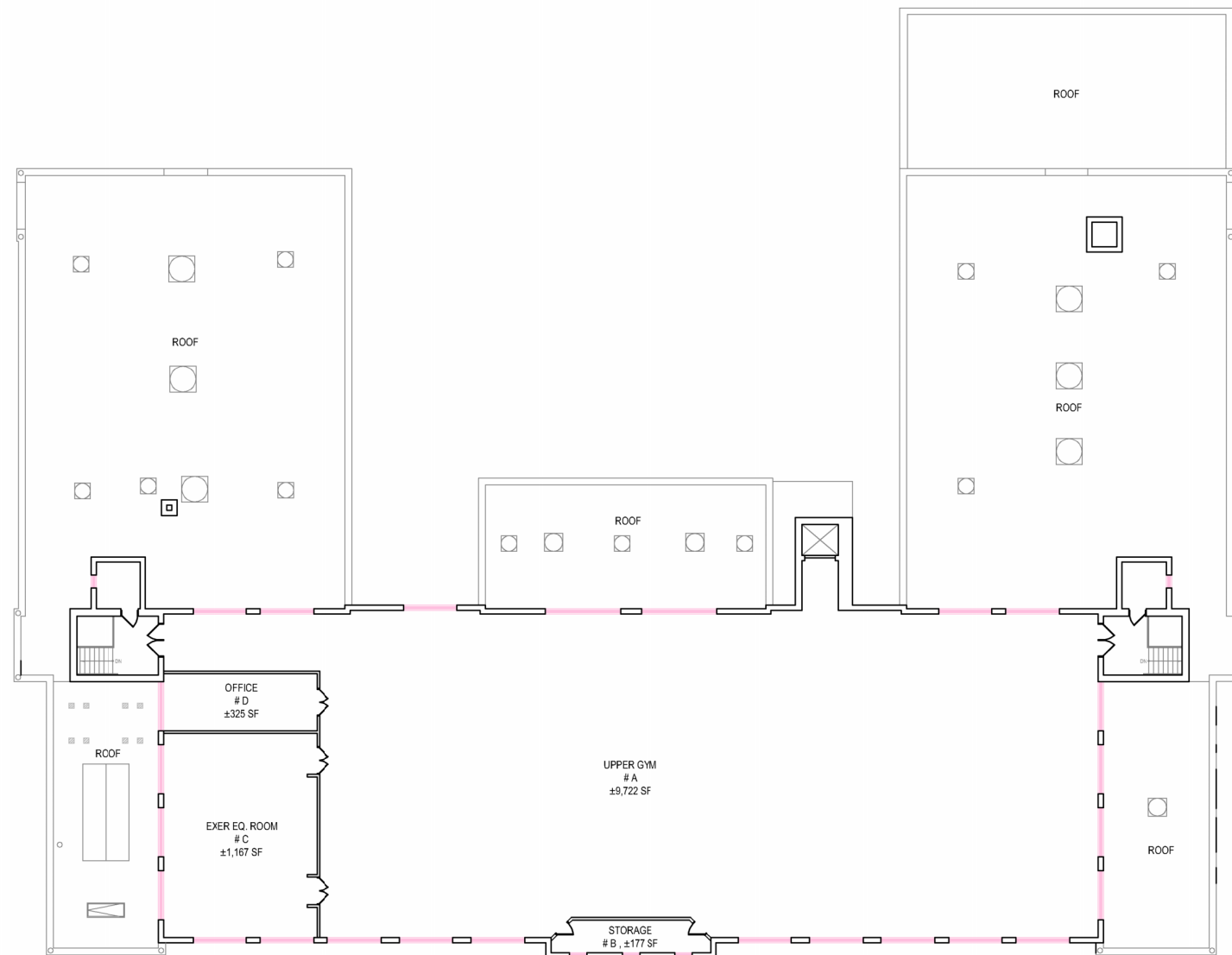
Third Floor

WHITE PLAINS CITY SCHOOL DISTRICT
SCOPE DRAWINGS PRE-BOND WORK

LEGEND:

- EXISTING TO REMAIN
- PROPOSED RENOVATION (FLOORING LVT/WOOD FLOOR REPAIRS, 1' X 1 GLUED SPLINE CEILINGS, NEW LIGHTING, WINDOWS, DOORS, HARDWARE, CASEWORK, AND WALL PAINTING REPAIR).
- ELECTRICAL AREA OF WORK, FOR PANELS AND SWITCH GEAR REPLACEMENTS, SEE ELECTRICAL PLANS FOR ADDITIONAL INFORMATION.
- WINDOW REPLACEMENT
- DOORS BEING REMOVED

NOTE:
FLOORINGS, CEILINGS, AND WALLS IN ALL OF THE HATCHED AREAS, AS WELL AS THE CAULKING AROUND THE WINDOWS SHALL BE TESTED FOR ASBESTOS, LEAD, PCBs, ETC. AREAS WHERE THERE ARE SUSPENDED CEILINGS, THE CEILINGS/FLOORS DECKS ABOVE TO BE TESTED. FOR UV REMOVALS, TEST FLOORING, WALL CONSTRUCTION AND LOVERS (CAULKING).



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Rochambeau High School

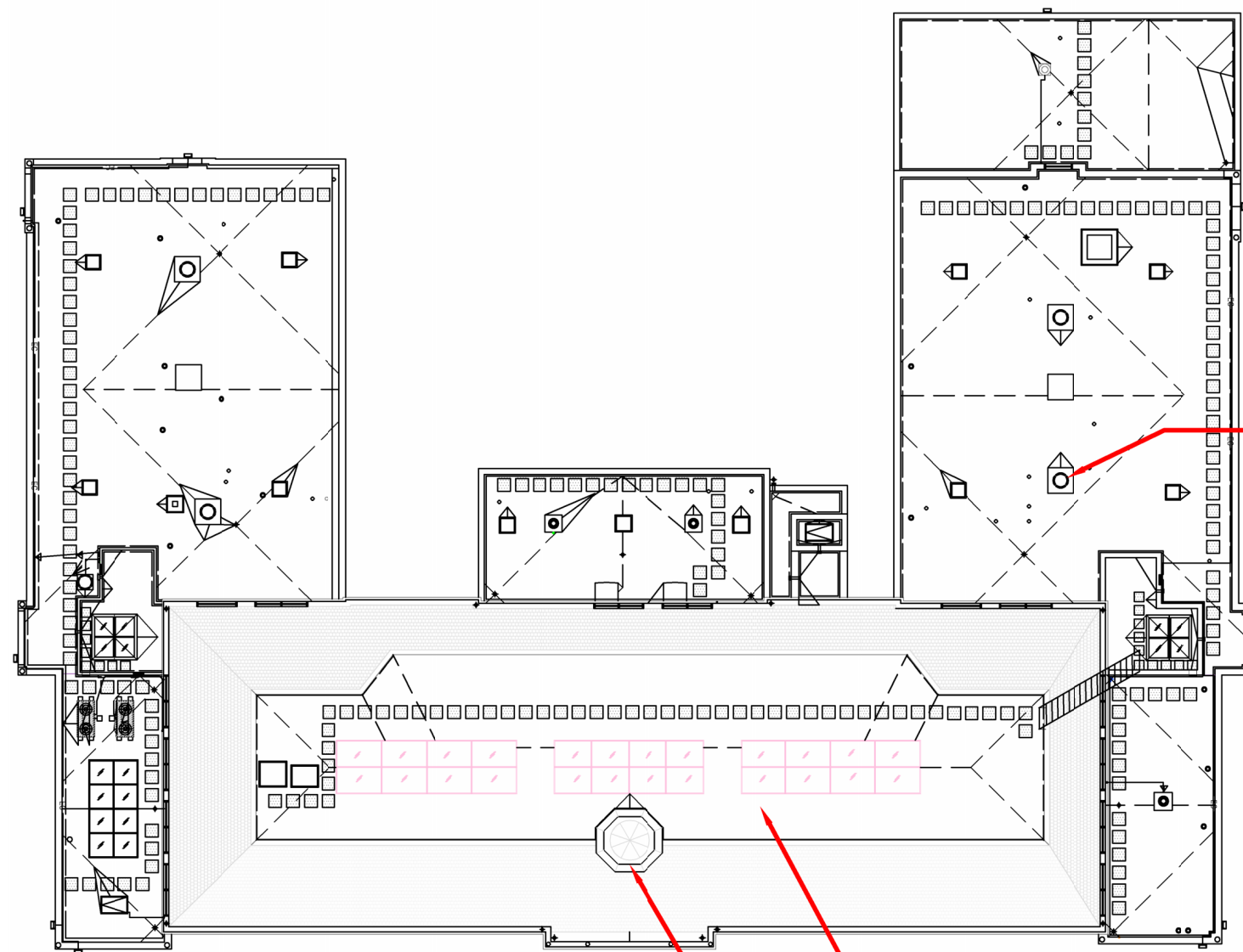
Third Floor

WHITE PLAINS CITY SCHOOL DISTRICT
SCOPE DRAWINGS PRE-BOND WORK

LEGEND:

- EXISTING TO REMAIN
- PROPOSED RENOVATION (FLOORING LVT/WOOD FLOOR REPAIRS, 1' X 1 GLUED SPLINE CEILINGS, NEW LIGHTING, WINDOWS, DOORS, HARDWARE, CASEWORK, AND WALL PAINTING REPAIR).
- ELECTRICAL AREA OF WORK, FOR PANELS AND SWITCH GEAR REPLACEMENTS, SEE ELECTRICAL PLANS FOR ADDITIONAL INFORMATION.
- WINDOW REPLACEMENT
- DOORS BEING REMOVED

NOTE:
FLOORINGS, CEILINGS, AND WALLS IN ALL OF THE HATCHED AREAS, AS WELL AS THE CAULKING AROUND THE WINDOWS SHALL BE TESTED FOR ASBESTOS, LEAD, PCBs, ETC. AREAS WHERE THERE ARE SUSPENDED CEILINGS, THE CEILINGS/FLOORS DECKS ABOVE TO BE TESTED. FOR UV REMOVALS, TEST FLOORING, WALL CONSTRUCTION AND LOVERS (CAULKING).



EXHAUST FANS TO BE REPLACED. TEST FLASHING, CAULKING, ETC. SEE MECHANICAL PLANS FOR SPECIFIC LOCATIONS

ROOF AREAS TO BE CORE SAMPLED (IF THERE IS NO PREVIOUS INFORMATION. THE ROOFS WERE REPLACED 5 YEARS AGO)

CUPOLA WINDOWS AND DOORS TO BE REPLACED. TEST WINDOW, CAULKING, PAINT, ETC.

BUILDING AREA
Basement Floor : ± 15,200 SF
Ground Floor : ± 29,696 SF
First Floor : ± 29,720 SF
Second Floor : ± 27,500 SF
Third Floor : ± 12,761 SF
Total : ± 114,877 SF