H 2 M architects + engineers

PROJECT MANUAL

VOLUME 2 OF 3: DIVISION 02 – DIVISION 33

SOMERS CENTRAL SCHOOL DISTRICT

250 US-202, Somers, NY 10589

CONSTRUCTION MANAGER: Triton Construction

550 7th Avenue, 14th Floor, New York NY 10018. (212) 388-5700

ROUTE 202 CAMPUS:

Somers Intermediate School – Various Upgrades

240 US – 202, Somers, NY 10589
SED Control #66-21-01-06-0-006-021
Project No.: SMSD2506

CONTRACT G2 – GENREAL CONSTRUCTION
CONTRACT P2 – PLUMBING CONSTRUCTION
CONTRACT M2 – MECHANICAL CONSTRUCTION
CONTRACT E2 – ELECTRICAL CONSTRUCTION

FINAL BID MANUAL

11/10/2026

H2M architects + engineers
1133 Westchester Ave, Suite N-210, White Plains, NY 10605
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The design of this project conforms to all applicable provision of the New York State Uniform Fire Prevention and Building Code, the New York State Energy Conservation Construction Code, and the building standards of the New York State Education Department.

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NOT USED

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A. All existing structures, site improvements, furnishings, piping, utilities or materials stored in the existing building shall be protected against damage as may be required by the Architect/Engineer/CM. The Contractor shall be responsible for any damage to the existing or installed works and appurtenances during construction operations and such damage shall be corrected by replacing the items damaged to their original condition and position at the Contractor’s cost and expense and to the satisfaction of the Architect/Engineer/CM.

3.02 PREPARATION

A. All portable equipment and furnishings shall be removed from the area of the existing building indicated. Equipment shall be stored as directed by the Architect/Engineer/CM.

B. Existing equipment which cannot be removed from the building shall be protected from damage by the Contractor’s operation. Walls, floors and equipment shall be adequately covered by plywood or other protective materials for the duration of the contract. No holes are permitted to be cut through the walls of the existing building, nor is the roof, any walls or other permanent part of the existing building to be removed to facilitate work under this Contract unless indicated otherwise. The Contractor shall protect existing water piping and water containing equipment from freezing.

C. All existing equipment and furnishings in the existing building shall be protected from damage by the Contractor's operations.

D. The Contractor shall be required to restore the existing building , equipment, and furnishings to a condition equal to what it was prior to the Contractor starting work. Any of the above that is damaged shall be replaced at the Contractor's cost.

3.03 CLEANING UP

A. The Contractor shall keep the project site free from waste materials and rubbish during the progress of the work and shall make a thorough cleaning of the building and site when the work is completed. Cleaning shall be done to the satisfaction of the Architect/Engineer/CM.

B. After completion of the contract, the Contractor will be required to clean up the site of all excavated materials and level off all excavations and dispose of all material as directed by the Architect/Engineer/CM and leave the site in as good condition as at the beginning of the contract.

C. All material used to protect the existing building shall be removed. The existing building shall be restored to its prior condition and shall be left broom/mop clean.

D. Buildings, grounds, paving, sidewalks, etc. shall be restored and left in a condition equal or better than that existing prior to the beginning of the work.

END OF SECTION 020100

PART 1 - GENERAL

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1.02 SUMMARY

A. Limited Regulated Building Materials Sujrvey Report performed by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. dated November 2, 2026, consisting of 130 pages. This Section includes the following:

B. Related Sections include the following:
   1. Section 028200 - Asbestos Remediation.
   2. Section 028300 - Lead Remediation.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION

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LIMITED REGULATED BUILDING MATERIALS SURVEY REPORT

For

Somers Intermediate School
240 RT. 202
Somers, New York 10589

TUSKERS SOMERS INTERMEDIATE SCHOOL
Forward in Excellence

Prepared For:

Somers Central School District
250 Route 202
Somers, New York 10589

SOMERS Central School District
Forward in Excellence

Prepared By:

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Associate

November 2, 2026
Langan Project No. 190150514

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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
AHERA	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

EXECUTIVE SUMMARY

This report by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) on behalf of the Somers Central School District, summarizes regulated building materials (RBM) limited survey findings for the select areas of the Somers Intermediate School, at 240 Rt.-202, Somers, New York 10589. 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) and polychlorinated biphenyls (PCBs) containing caulk/sealants.

PROJECT INFORMATION:

Client Name:		H2M Architects+Engineers (H2M)		
Professional's Project Manager:		Craig Napolitano		
Professional's Project Manager Phone No.:		973.560.4610		
Professional's Project Manager Email:		cnapolitano@langan.com		
Professional's Project #:		190150514		
Survey Date(s):		September 22, 23 & 24, 2026		
Property Address:		240 Rt.-202, Somers, New York 10589		
No. of Buildings on Property:		1		
Building(s)/Structure(s) Details				
Building Identification:	Construction Dates:	No. of Stories:	~ Gross Footage:	Block(s)/Lot(s)
Somers Intermediate School	Unknown	1-story	Unknown	Unknown

KEY FINDINGS

(For building spaces affected by the planned project activities as identified in July, 2026 Various Upgrades at Somers Intermediate School SED Submission drawings set prepared by H2M Architects+Engineers.)

Asbestos-Containing Materials (ACM)

The following is a summary of suspect building materials which were identified and reported to contain asbestos exceeding one percent (>1%) by weight and are ACM or were inaccessible for sampling and are assumed as ACM in spaces surveyed:

Material	Material Locations	Survey Results	Estimated Quantity	Notes/Comments
BUILDING INTERIORS - ACM/ASSUMED ACM FINDINGS				
Pipe insulation and mud pipe fitting insulation	Concealed in wet walls to bathrooms - Girl's 114, All Gender 115 & 116, Girl's 132, Boy's 137, Girl's 138, Boy's 140	ACM	150 LF	As per AHERA report. Quantify is an allowance. May not be affected by scope of work
Ceramic wall tile grout & concealed wall tile backing, mastic, and setting bed behind ceramic wall tiles	Bathrooms - All Gender 115 & 116, Girl's 125, Boy's 125A, Girl's 132, Boy's 137, Girl's 138, Boy's 140	Assumed ACM	2,500 SF	Intrusive sampling was omitted due to building occupancy.
Mirror Mastic	Bathrooms - Girl's 114, All Gender 115 & 116, Girl's 132, Boy's 137, Girl's 138	Assumed ACM	60 SF	Intrusive sampling was omitted due to building occupancy.
Ceramic floor tile grout & concealed mortar, setting bed, and waterproofing materials below ceramic floor tiles	Bathrooms - Girl's 114, All Gender 115 & 116, Girl's 125, Girl's 132, Boy's 137, Girl's 138	Assumed ACM	455 SF	Intrusive sampling was omitted due to building occupancy.
BUILDING EXTERIORS - ACM/ASSUMED ACM FINDINGS				
Multi-layered built-up roofing and roof flashing materials (membrane layers and vapor barrier/tar on roof deck) - Exposed and under EPDM membrane	Roofs - For air intake removal and new fan unit installation - 9 locations	Assumed ACM	180 SF	Intrusive sampling was omitted due to building occupancy.

Material	Material Locations	Survey Results	Estimated Quantity	Notes/Comments
Concealed waterproofing materials (i.e. tar/felt membrane) on walls, columns & spandrel beams behind brick veneer & contaminated brick/cinderblock.	School Building Façades	Assumed ACM	40 SF	'Intrusive sampling was omitted due to building occupancy. Potentially affected at West Elevation @ Large Courtyard

Non-Asbestos-Containing Materials (Non-ACM) with Asbestos at a Concentration ≤ 1%

The following materials were found to contain trace amounts of asbestos (less than 1%) and, while not classified as asbestos-containing materials (ACM), are still regulated under certain provisions of the Occupational Safety and Health Administration (OSHA) and state asbestos regulations.

NON-ACM BUT CONTAINING ASBESTOS FIBERS <1.0% FINDINGS			
Carpet Pad Mastic	Room 123 Library/ Multimedia Center	Non-ACM	CHRY< 1%

Based on the test results and as per the definition of asbestos containing materials (ACM) by the EPA/NYSDOL/NYCDEP, the materials identified in above table are considered as non-ACM, however, any demolition/renovation activities which would affect such materials must be performed following OSHA safe work practices including but not limited to work areas isolation, use of proper personal protective equipment, engineering controls, wet procedures, etc. **Langan strongly recommends retaining an asbestos abatement contractor to perform any demolition activities which would disturb above identified materials**. Additionally, the waste generated from such materials and any other materials which contain detectable levels of asbestos shall be disposed of at a landfill that is permitted to accept asbestos waste.

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. Asbestos sampling locations are shown in Drawings ASL-01 through ASL-02.

Lead Containing Paint (LCP)

As per EPA 40 CFR Part 745, TSCA, Title IV (Lead Exposure Reduction), the term "lead based paint" (LBP) means paint or other surface coatings that contain lead equal to or more than 1.0 milligrams per centimeter (mg/cm^2) or 0.5 percent by weight. Although the EPA defines LBP as paint having lead concentrations equal or greater than 1.0 mg/cm^2, the Occupational Safety and Health Administration (OSHA) considers any paint with any measurable concentration of lead as lead containing paint (LCP).

Langan conducted 17 assays using an X-Ray Fluorescence (XRF) analyzer to screen the structure to identify lead concentrations in painted surfaces. Of these 17 XRF readings, 8 showed detectable concentrations of lead. No readings contained lead concentration above 1.0 milligram per square centimeter (1.0 mg/cm^2).

Overall, the paint on various building components was observed in good to fair condition.

Refer to Table 2 for the XRF screening data.

PCBs Findings

PCB Bulk Product Waste is defined in USEPA Code of Federal Regulations 40 CFR 761.3 with specific disposal options identified in 40 CFR 761.62. PCB Bulk Product Waste means waste derived from manufactured products containing PCBs in a non-liquid state (e.g. caulk and glazing sealants), at any concentration where the concentration at the time of designation for disposal was ≥50 parts per million (PPM) PCBs.

Currently twelve (12) bulk samples of suspect caulk were collected during the survey and submitted for PCB analysis.

PCBs concentrations greater than 50 PPM were detected in four (4) samples collected by Langan: four (4) of the concentrations were greater than 50 PPM:

- Envelope caulk around window frames – Small Courtyard - Exterior
- Metal panel caulk - brown/gray – Large Courtyard – Exterior

PCBs concentrations of less than 50 PPM were detected in 3 samples:

- Sink caulk – Bathroom 116
- Both Cast stone caulks – Large Courtyard - Exterior

The activities of the proposed scope of work will disturb these materials.

PCBs were not detected in five (5) samples analyzed:

- Sink caulk – Bathroom 115
- Both Wall expansion joint caulk Type 1- Perimeter Walls - Exterior
- Both Wall expansion joint caulk Type 2- Perimeter Walls - Exterior

Test results are summarized in Table 3.

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 Somers Central School District, summarizes regulated building materials (RBM) limited survey findings for the select areas of the Somers Intermediate School, at 240 Rt.-202, Somers, New York 10589.

The objective of this pre-renovation RBM survey was to identify the presence/absence of asbestos-containing materials (ACM), lead containing paint (LCP), and polychlorinated biphenyls (PCB) containing caulk/sealants affected by the planned school upgrades. The survey was limited to building spaces affected by the intended project activities as identified in June 26 Various Upgrades at Somers Intermediate School SED Submission drawings set prepared by H2M Architects+Engineers. Building spaces surveyed are depicted in Drawings.

The remainder of this report presents our observations, findings, laboratory test results of samples collected, description of approximate locations of ACM, LCP and PCB-containing materials identified, conclusions and plans showing asbestos sampling locations.

1.2 Assumptions, Limitations and Exceptions

Opinions, conclusions and recommendations presented in this report apply to the site conditions that are 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 eliminate the possibility of obtaining partial, imprecise, or incomplete information. 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.

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. There are limitations inherent to visual surveys, and therefore, this hazmat survey does not claim to have sampled all possible suspect ACM, LCP and PCB containing materials present in the building.

Any suspect materials found during construction which differ from materials sampled as part of this survey should be assumed to be ACM, LCP and PCB containing until surveyed by a professionally trained and certified individual and tested by an accredited laboratory.

2.0 SITE DESCRIPTION

Somers Intermediate School is part of the Somers Central School District (SCSD), which was formally created in 1952 through the consolidation of numerous small, local schoolhouses that had served the area since the 19th and early 20th centuries. The surveyed Somers Intermediate School is a public school located at 240 RT. 202, Somers, NY 10589, serving grades 3–5 exclusively, within the Somers Central School District. The school is situated in Westchester County. The one-story subject building is constructed out of stone, brick and steel.

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 <u>not employed.</u> 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 Atlas Environmental Lab, Corp. laboratory of New York (Atlas). Atlas 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:

- AHERA Management Plan
- 2026.03.30 Langan Survey
- June 26 Various Upgrades at Somers Intermediate School SED Submission drawings set prepared by H2M Architects+Engineers.

Refer to Appendix D for the copies of available record files reviewed.

3.4 Observations and Findings

The ACM survey of subject building areas was conducted on September 22, 23 & 24, 2026, by Langan's Drew Cheskin and Michael Benson, NYSDOL certified asbestos inspectors and USEPA certified lead inspectors. 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 condition.

Refer to Table 1 for a detailed summary of asbestos survey findings. Copies of analytical results and chain of custody documentation for the samples collected during the surveys are provided in Appendix A. Asbestos sampling locations are depicted on Figures ASL-01 through ASL-02.

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

Langan personnel conducted screening of painted building components that would be potentially affected by the proposed scope of work. 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 Viken Pb200e X-Ray Fluorescence (XRF) Spectrum Analyzer was used to survey the subject building for the presence of lead-containing paint (LCP). The Viken Pb200e 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 1.04 mg/cm^2 lead based paint film (positive calibration) and <0.001 mg/cm^2 lead based paint film (negative calibration). 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 testing activities.

4.3 LCP Findings

Based on the XRF screening data and available file review the paint on following building components was identified to contain lead above 1.0 mg/cm^2:

- Blue paint on tag boards – Interior Spaces.
- Yellow paint on concrete curb – Exterior.

Most of the painted surfaces were identified to contain detectable concentrations of lead. In general, the painted surfaces were observed to be in good to fair condition.

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; in pigments, dyes, and carbonless copy paper; and many other industrial products 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.

The PCB screening sampling involved a visual examination of the building and sampling of suspect caulking or sealant materials. Twelve (12) bulk samples of homogenous caulks were collected from the building surveyed areas and submitted to Phoenix laboratory for PCB analysis using EPA SW-846 3540C/8082A.

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.

PCBs concentrations greater than 50 PPM were detected in four (4) samples collected by Langan: four (4) of the concentrations were greater than 50 PPM:

- Envelope caulk around window frames – Small Courtyard - Exterior

- Metal panel caulk - brown/gray – Large Courtyard – Exterior

PCBs concentrations of less than 50 PPM were detected in 3 samples:

- Sink caulk – Bathroom 116
- Both Cast stone caulks – Large Courtyard – Exterior

PCBs were not detected in five (5) samples analyzed:

- Sink caulk – Bathroom 115
- Both Wall expansion joint caulk Type 1- Perimeter Walls - Exterior
- Both Wall expansion joint caulk Type 2- Perimeter Walls – Exterior

Test results are summarized in Table 3.

6.0 CONCLUSIONS

6.1 Asbestos Containing Materials

Asbestos containing materials were identified in the building areas surveyed. 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 NYSDOL 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

The LCP assessment that was performed was not intended to be a surface-by-surface determination of specific locations of LCP or lead-based paint, but rather the purpose of the screening measurements was to provide a general understanding if there was a presence of lead in painted coatings at the Site that could impact the planned renovation activities.

Limited painted surfaces in the building surveyed areas contain paint with lead concentrations above 1.0 mg/cm^2. Most of the painted surfaces 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 renovation it is recommended that representative samples of the building components

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

PCBs were detected in the caulking samples analyzed that are anticipated to be impacted by activities within the proposed renovation scope. Accordingly, remedial measures or additional actions related to PCBs in the caulking are required.

Certain existing caulking materials are located in the project-related activities and are anticipated to be disturbed, were reported to contain PCB concentrations above 50 parts per million (PPM), as well as detectable concentrations below 50 PPM.

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 conducted by Qualified Environmental Professionals, Mr. Michael Benson and Mr. Drew Cheskin. These individuals have specific qualifications based on education, training, and/or experience to assess the property of 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.



Micheal Benson
NYSDOL Asbestos Inspector
Cert# 26-61OUA-SHAB



Drew Cheskin
NYSDOL Asbestos Inspector
Cert# 26-61X9V-SHAB

TABLES

Table 1 - SUMMARY OF ASBESTOS SURVEY FINDINGS
Project "SED RBM @ Somers IS" 240 US-202, Somers, NY 10589

Sample ID	Material	Material Locations			Estimated Quantity of ACM	Notes/Comments
BUILDING INTERIORS - ACM/ASSUMED ACM FINDINGS						
--	Pipe insulation and mud pipe fitting insulation	Concealed in wet walls to bathrooms - Girl's 114, All Gender 115 & 116, Girl's 132, Boy's 137, Girl's 138, Boy's 140	ACM	--	150 LF	As per AHERA report. Quantify is an allowance. May not be affected by scope of work
--	Ceramic wall tile grout & concealed wall tile backing, mastic, and setting bed behind ceramic wall tiles	Bathrooms - All Gender 115 & 116, Girl's 125, Boy's 125A, Girl's 132, Boy's 137, Girl's 138, Boy's 140	Assumed ACM	--	2,500 SF	Intrusive sampling was omitted due to building occupancy.
	Mirror Mastic	Bathrooms - Girl's 114, All Gender 115 & 116, Girl's 132, Boy's 137, Girl's 138	Assumed ACM	--	60 SF	Intrusive sampling was omitted due to building occupancy.
--	Ceramic floor tile grout & concealed mortar, setting bed, and waterproofing materials below ceramic floor tiles	Bathrooms - Girl's 114, All Gender 115 & 116, Girl's 125, Girl's 132, Boy's 137, Girl's 138	Assumed ACM	--	455 SF	Intrusive sampling was omitted due to building occupancy.
BUILDING EXTERIORS - ACM/ASSUMED ACM FINDINGS						
--	Multi-layered built-up roofing and roof flashing materials (membrane layers and vapor barrier/tar on roof deck) - Exposed and under EPDM membrane	Roofs - For air intake removal and new fan unit installation - 9 locations	Assumed ACM	--	180 SF	Intrusive sampling was omitted due to building occupancy.
--	Concealed waterproofing materials (i.e. tar/felt membrane) on walls, columns & spandrel beams behind brick veneer & contaminated brick/cinderblock.	School Building Façades	Assumed ACM	--	40 SF	Intrusive sampling was omitted due to building occupancy. Potentially affected at West Elevation @ Large Courtyard
NON-ACM BUT CONTAINING ASBESTOS FIBERS <1.0% FINDINGS						
CPM-1	Carpet Pad Mastic	LIBRARY 123	Non-ACM	CHRY Trace 1.0%		'As per current Langan's survey. (2026)
NON-ACM FINDINGS						
CPP-6	1 by 1 ceiling tile rough	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CPP-7	2 by 2 ceiling tile textured	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CPP-8	2 by 4 ceiling tile deep grooved	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CPP-9	2 by 2 ceiling tiles dimple with pinhole	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CPP-10	2 by 4 ceiling tile deep grooved	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CPP-11	2 by 2 ceiling tile pinhole	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CMUM-1	CMU block mortar	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CMUM-2	CMU block mortar	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
TECT-1	Tectum wall panels	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
BM-1	Brick mortar	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
SPF-1	Spray on fireproofing	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
DW-1	Drywall	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)

Table 1 - SUMMARY OF ASBESTOS SURVEY FINDINGS
Project "SED RBM @ Somers IS" 240 US-202, Somers, NY 10589

Sample ID	Material	Material Locations			Estimated Quantity of ACM	Notes/Comments
JC-1	Joint compoumd	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
DW-2	Drywall newer vintage	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
JC-2	Joint compound newer vintage	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CM-1	Carpet mastic yellow	Library 123	Non-ACM	--		'As per current Langan's survey. (2026)
SC-1A	Sink caulk	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
SWM-1	Store wall mortar	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
CSC-1	Cast stone caulk	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
MPC-1	Metal panel caulk	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
EC-1	Expansion caulk cream	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
EC2-2	Expansion caulk gray	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
WFC-1	Envelope caulk around window frames	Select Surveyed Areas	Non-ACM	--		'As per current Langan's survey. (2026)
FT-1	12-inch beige with black spots floor tile	Room 125C - Front Section	Non-ACM	--		As per Langan's survey. (March 2026)
FTM-1	Mastic to floor tile (FT-1)	Room 125C - Front Section	Non-ACM	--		As per Langan's survey. (March 2026)
FT-2	12-inch light olive floor tile	Nurse's Office 112 & Closet 112A	Non-ACM	--		As per Langan's survey. (March 2026)
FTM-2	Mastic to floor tile (FT-2)	Nurse's Office 112 & Closet 112A	Non-ACM	--		As per Langan's survey. (March 2026)
CM-1	Carpet mastic	Select Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
CG-1	Carpet glue	Corridor along Nurse's Office Closet 112A	Non-ACM	--		As per Langan's survey. (March 2026)
CG-2	Carpet glue	Main Office 1 and Assistant Principal 2	Non-ACM	--		As per Langan's survey. (March 2026)
FLC-1	Cementitious floor leveling compound (under carpet or vinyl floor tiles)	Select Surveyed Areas	Non-ACM ACM	--		As per Langan's survey. (March 2026)
FLC-2	Cementitious floor leveling compound	Corridor along Nurse's Office Closet 112A	Non-ACM	--		As per Langan's survey. (March 2026)
BB-1	Black (old) baseboard	Select Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
BBM-1	Mastic to baseboard (BB-1)	Select Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
BB-2	Black (newer) baseboard	Select Surveyed Areas	Non-ACM ACM	--		As per Langan's survey. (March 2026)
BBM-2	Mastic to baseboard (BB-2)	Select Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
BB-3	Green baseboard	Nurse's Office 112 & Closet 112A	Non-ACM ACM	--		As per Langan's survey. (March 2026)
BBM-3	Mastic to baseboard (BB-2)	Nurse's Office 112 & Closet 112A	Non-ACM	--		As per Langan's survey. (March 2026)
BB-4	Tan baseboard & mastic	Lobby	Non-ACM	--		As per Langan's survey. (March 2026)
BTB-1	Blue tag board	Select Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
TAG-1	Lt. Gray tag board	Select Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
TAG-2	Tan tag board	Select Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
CPP-1	2x2 ceiling panel with grooves and pin holes	Art Room E10	Non-ACM	--		As per Langan's survey. (March 2026)

Table 1 - SUMMARY OF ASBESTOS SURVEY FINDINGS
Project "SED RBM @ Somers IS" 240 US-202, Somers, NY 10589

Sample ID	Material	Material Locations			Estimated Quantity of ACM	Notes/Comments
CPP-2	2x4 ceiling panel with grooves and pin holes	Room 125C and Surrounding Rooms	Non-ACM	--		As per Langan's survey. (March 2026)
CPP-3	2x4 ceiling panel smooth white	Room 125C between A6 & A14 (ramp corridor)	Non-ACM	--		As per Langan's survey. (March 2026)
CPP-4	2x2 ceiling panel smooth white	Nurse's Office 112	Non-ACM	--		As per Langan's survey. (March 2026)
CPP-5	2x2 ceiling panel rough with pin holes	Lobby	Non-ACM	--		As per Langan's survey. (March 2026)
CT-1	1x4 ceiling tile	Room 125C and Surrounding Rooms	Non-ACM	--		As per Langan's survey. (March 2026)
IDC-1	Interior door caulk	Select Surveyed Areas - Perimeter Walls	Non-ACM	--		As per Langan's survey. (March 2026)
IWC-1	Interior window caulk	Select Surveyed Areas - Perimeter Walls	Non-ACM	--		As per Langan's survey. (March 2026)
SR-1	Gypsum board at upper window and door opening	Throughout Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
SR-2	Gypsum wall board	Throughout Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
JC-1	Joint compound to gypsum wall board	Throughout Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
MM-1	Masonry mortar	Throughout Surveyed Areas	Non-ACM	--		As per Langan's survey. (March 2026)
CFGR-1	Ceramic floor grout	Lobby and Office Section	Non-ACM	--		As per Langan's survey. (March 2026)
CFBM-1	Ceramic floor bedding mortar	Lobby and Office Section	Non-ACM	--		As per Langan's survey. (March 2026)
SH-1	Roof shingle	Shed - Exterior	Non-ACM	--		As per Langan's survey. (March 2026)
APH-1	Driveway asphalt	Driveway - Exterior	Non-ACM	--		As per Langan's survey. (March 2026)
FEJ-1	Joint fill material between wall and sidewalk	Exterior by Main Entrance	Non-ACM	--		As per Langan's survey. (March 2026)
SCN-1	Sidewalk concrete	Exterior	Non-ACM	--		As per Langan's survey. (March 2026)
EST-1	Exterior stucco plaster	Exterior - Perimeter Walls	Non-ACM	--		As per Langan's survey. (March 2026)
BMR-1	Brick mortar	Exterior - Perimeter Walls	Non-ACM	--		As per Langan's survey. (March 2026)
SWVC-1	Side wall vertical caulk	Exterior - Perimeter Walls	Non-ACM	--		As per Langan's survey. (March 2026)
WEJ-1	Wall expansion joint caulk	Exterior - Perimeter Walls	Non-ACM	--		As per Langan's survey. (March 2026)
CSC-1	Concrete sidewalk joint caulk	Exterior by Main Entrance	Non-ACM	--		As per Langan's survey. (March 2026)
EDC-1	Exterior door caulk - brown/gray	Exterior - Perimeter Walls	Non-ACM	--		As per Langan's survey. (March 2026)
EDC-2	Exterior door caulk - pink	Exterior - Perimeter Walls	Non-ACM	--		As per Langan's survey. (March 2026)

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 Friable = Any material that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure, or is capable of being released into the air by hand pressure.
5 Non-Friable = Any material that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure, and is not capable of being released into the air by hand pressure.
6 Potentially Friable = Any non-friable material that when dry, will be subjected to sanding, grinding, cutting or abrading, or 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.

Table 2 - XRF SCREENING RESULTS

Project "SED RBM @ Somers IS" 240 US-202, Somers, NY 10589

Reading ID #	Component	Substrate	Color	Test Location		Total Lead mg/cm²	Results	Comments
				Floor	Area			
1	Positive Calibration					0.9		
2	Positive Calibration					1		9/23/2026
3	Positive Calibration					1		
4	Negative Calibration					0		
5	Negative Calibration					0		9/23/2026
6	Negative Calibration					-0.2		
7	Wall	CMU	White	1	Library 123	0.1	LCP	---
8	Door	Metal	Purple	1	Library 123	0.1	LCP	---
9	Wall	CMU	Gray	1	Corridor HW-1D	0.2	LCP	---
10	Wall	Gypsum Board	Gray	1	Corridor HW-1D	-0.3	NON	---
11	Wall	CMU	White	1	Room 137A	0.2	LCP	---
12	Wall	Gypsum Board	White	1	Room 137A	0.1	LCP	---
13	Wall	CMU	Gray	1	Room C4	0	NON	---
14	Wall	Gypsum Board	Gray	1	Room C4	-0.2	NON	---
15	Wall	Gypsum Board	White	1	Room C13	0.2	LCP	---
16	Wall	Gypsum Board	Cream	1	Corridor HW-1J	0	NON	---
17	Wall	Gypsum Board	White	1	Room 131A	0	NON	---
18	Wall	Wood	Gray	1	Corridor HW-1G	0	NON	---
19	Wall	CMU	White	1	Corridor HW-1B	-0.2	NON	---
20	Wall	CMU	Gray	1	Corridor HW-1B	0	NON	---
21	Wall	Gypsum Board	Red	1	Cafeteria	0.2	LCP	---
22	Wall	CMU	White	1	Gym	0.1	LCP	---
23	Wall	Gypsum Board	Red	1	Corridor HW-1C	0	NON	---
24	Positive Calibration					0.9		
25	Positive Calibration					1		9/23/2026
26	Positive Calibration					1		
27	Negative Calibration					0		
28	Negative Calibration					-0.2		9/23/2026
29	Negative Calibration					0		
PREVIOUS XRF SCREENING RESULTS								
1	Positive Calibration					1.00		
2	Positive Calibration					1.00		3/2/2026
3	Positive Calibration					0.90		
4	Negative Calibration					0.00		
5	Negative Calibration					-0.10		3/2/2026
6	Negative Calibration					0.00		
7	Wall	CMU	White	1	Art Classroom E10	-0.20	NON	---
8	Door Frame	Metal	Gray	1	Art Classroom E10	-0.30	NON	---
9	Door	Wood	Varnish	1	Art Classroom E10	0.00	NON	---
10	Wall	CMU	White	1	Art Classroom E10	0.10	LCP	---
11	Door	Metal	Brown	1	Art Classroom E10	-0.20	NON	---
12	Wall	Gypsum Board	White	1	Art Classroom E10	0.10	LCP	---
13	Door Frame	Metal	Black	1	Art Classroom E10	0.20	LCP	---
14	Door	Wood	Varnish	1	Art Classroom E10	0.00	NON	---
15	Truss	Metal	Black	1	Art Classroom E10	0.10	LCP	---
16	Ceiling	Metal	Gray	1	Art Classroom E10	0.00	NON	---
17	Register	Metal	Black	1	Art Classroom E10	0.00	NON	---
18	Column	Metal	Brown	1	3rd Grade Zone 125C	0.50	LCP	---
19	Beam	Metal	Brown	1	3rd Grade Zone 125C	0.70	LCP	---
20	Wall	Gypsum Board	White	1	3rd Grade Zone 125C	-0.10	NON	---
21	Wall	CMU	White	1	3rd Grade Zone 125C	-0.10	NON	---
22	Column	Wood	Varnish	1	3rd Grade Zone 125C	0.00	NON	---
23	Wall	Gypsum Board	Light Gray	1	Room A14	0.10	LCP	---
24	Column	Wood	Black	1	3rd Grade Zone 125C	0.00	NON	---
25	Wall	Gypsum Board	White	1	Classroom A6	0.10	LCP	---
26	Wall	CMU	White	1	Classroom A6	0.20	LCP	---
27	**Tag board**	**Cellulose Fibers**	**Blue**	**1**	**Classroom A5**	**1.50**	**LBP**	**---**
28	**Tag board**	**Cellulose Fibers**	**Blue**	**1**	**Classroom A4**	**1.10**	**LBP**	**---**
29	Door	Metal	Gray	1	3rd Grade Zone 125C	0.00	NON	---
30	Tag board	Cellulose Fibers	Gray	1	Classroom A3	-0.10	NON	---
31	Wall	Gypsum Board	White	1	Classroom A2	0.00	NON	---
32	Floor	Wood	Black	1	Classroom A2	-0.10	NON	---
33	Wall	CMU	White	1	Corridor by Nurse's Office	-0.30	NON	---

Table 2 - XRF SCREENING RESULTS

Project "SED RBM @ Somers IS" 240 US-202, Somers, NY 10589

Reading ID #	Component	Substrate	Color	Test Location		Total Lead mg/cm^2	Results	Comments
				Floor	Area			
34	Wall	Gypsum Board	Light Gray	1	Corridor by Nurse's Office	0.00	NON	---
35	Tag board	Cellulose Fibers	Gray	1	Corridor by Nurse's Office	0.10	LCP	---
36	Wall	CMU	White	1	Nurse's Office 112	-0.10	NON	---
37	Column	Wood	Gray	1	Main Office 1	0.10	LCP	---
38	Wall	CMU	White	1	Main Office 1	0.00	NON	---
39	Door Frame	Metal	Gray	1	Main Office 1	0.00	NON	---
40	Door	Wood	Varnish	1	Main Office 1	0.00	NON	---
41	Floor	Ceramic Tile	Tan	1	Main Office 1	0.20	LCP	---
42	Floor	Ceramic Tile	Beige	1	Main Office 1	0.20	LCP	---
43	Wall	Gypsum Board	White	1	Lobby	0.10	LCP	---
44	Wall	Gypsum Board	Red	1	Lobby	0.10	LCP	---
45	Ceiling	Wood	Varnish	1	Lobby	-0.10	NON	---
46	Radiator Cover	Metal	Brown	1	Lobby	0.10	LCP	---
47	Floor	Ceramic Tile	Black	1	Lobby	0.00	NON	---
48	Window Frame	Wood	Varnish	1	Lobby	0.10	LCP	---
49	Positive Calibration					0.90		
50	Positive Calibration					0.90		3/2/2026
51	Positive Calibration					1.00		
52	Negative Calibration					0.00		
53	Negative Calibration					0.00		3/2/2026
54	Negative Calibration					-0.10		
55	Positive Calibration					1.00		
56	Positive Calibration					0.90		3/4/2026
57	Positive Calibration					0.90		
58	Negative Calibration					-0.10		
59	Negative Calibration					-0.10		3/4/2026
60	Negative Calibration					-0.10		
61	Driveway	Asphalt	White	_	Parking Driveway	0.10	LCP	---
62	Driveway	Asphalt	White	_	Driveway Crosswalk	-0.10	NON	---
63	**Curb**	**Concrete**	**Yellow**	_	**Parking Driveway**	**1.00**	**LBP**	**---**
64	Curb	Concrete	Yellow	_	Parking Driveway	0.20	LCP	---
65	Curb	Concrete	Yellow	_	Parking Driveway	0.00	NON	---
66	Curb	Concrete	Yellow	_	Parking Driveway	0.20	LCP	---
67	Curb	Wood	Brown	_	Sidewalk	-0.10	NON	---
68	Curb	Wood	Brown	_	Sidewalk	0.00	NON	---
69	Curb	Concrete	Yellow	_	Parking Driveway	0.10	LCP	---
70	Curb	Wood	Beige	_	Sidewalk	0.30	LCP	---
71	Driveway	Asphalt	Yellow	_	Parking Driveway	0.10	LCP	---
72	Wall	Wood	Brown	_	Shed	0.00	NON	---
73	Wall	Wood	Beige	_	Shed	-0.10	NON	---
74	Wall	Stucco	Beige	_	School Wall - Exterior	-0.20	NON	---
75	Column	Plaster	White	_	School Entrance - Exterior	-0.50	NON	---
76	Column	Plaster	White	_	School Entrance - Exterior	0.00	NON	---
77	Positive Calibration					0.90		
78	Positive Calibration					0.80		3/4/2026
79	Positive Calibration					0.90		
80	Negative Calibration					0.00		
81	Negative Calibration					-0.10		3/4/2026
82	Negative Calibration					-0.10		

Note: Although Langan recognizes that the EPA definition of Lead-Based Paint (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. OSHA considers any paint or material with any measurable concentration of lead as lead containing paint (LCP) or lead containing material (LCM).

NON	= Negative Lead Result
LCP	= OSHA any detectable concentration of lead.
LBP	= Positive for lead-based paint (1.0 mg/cm2 or greater) as defined under 40 CFR Part 745.

Table 3 - SUMMARY OF CAULK SAMPLE PCB ANALYSES RESULTS Project "SED RBM @ Somers IS" 240 US-202, Somers, NY 10589							
Material	**Sample ID #**	**Material Location**	**PCB Type**	**Results [µg/Kg]//[PPM]**	**PCB or Non-PCB**	**Material Estimated Quantity**	**Comments**
Envelope caulk around window frames	**WFC-1P**	**Small courtyard**	**PCB-1016**	**ND // 0.00**	**PCB**	**---**	**___**
			PCB-1221	**ND // 0.00**			
			PCB-1232	**ND // 0.00**			
			PCB-1242	**ND // 0.00**			
			PCB-1248	**ND // 0.00**			
			PCB-1254	**ND // 0.00**			
			PCB-1260	**75,000,000 // 75,000.00**			
			PCB-1262	**ND // 0.00**			
			PCB-1268	**ND // 0.00**			
Envelope caulk around window frames	**WFC-2P**	**Small courtyard**	**PCB-1016**	**ND // 0.00**	**PCB**	**---**	**___**
			PCB-1221	**ND // 0.00**			
			PCB-1232	**ND // 0.00**			
			PCB-1242	**ND // 0.00**			
			PCB-1248	**ND // 0.00**			
			PCB-1254	**49,000,000 // 49,000.00**			
			PCB-1260	**ND // 0.00**			
			PCB-1262	**ND // 0.00**			
			PCB-1268	**ND // 0.00**			
Metal panel caulk	**MPC-1P**	**Large courtyard**	**PCB-1016**	**ND // 0.00**	**PCB**	**---**	**___**
			PCB-1221	**ND // 0.00**			
			PCB-1232	**ND // 0.00**			
			PCB-1242	**ND // 0.00**			
			PCB-1248	**ND // 0.00**			
			PCB-1254	**ND // 0.00**			
			PCB-1260	**61,000 // 61.00**			
			PCB-1262	**ND // 0.00**			
			PCB-1268	**ND // 0.00**			
Metal panel caulk	**MPC-2P**	**Large courtyard**	**PCB-1016**	**ND // 0.00**	**PCB**	**---**	**___**
			PCB-1221	**ND // 0.00**			
			PCB-1232	**ND // 0.00**			
			PCB-1242	**ND // 0.00**			
			PCB-1248	**ND // 0.00**			
			PCB-1254	**ND // 0.00**			
			PCB-1260	**70,000 // 70.00**			
			PCB-1262	**ND // 0.00**			
			PCB-1268	**ND // 0.00**			
Sink caulk	SC-1P	Room 115	PCB-1016	ND // 0.00	NON-PCB	---	___
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	ND // 0.00			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			

Table 3 - SUMMARY OF CAULK SAMPLE PCB ANALYSES RESULTS
Project "SED RBM @ Somers IS" 240 US-202, Somers, NY 10589

Material	Sample ID #	Material Location	PCB Type	Results [µg/Kg]//[PPM]	PCB or Non-PCB	Material Estimated Quantity	Comments
Sink caulk	SC-2P	Room 116	PCB-1016	ND // 0.00	NON-PCB	---	___
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	800 // 0.80			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			
Cast stone caulk	CSC-1P	Large courtyard	PCB-1016	ND // 0.00	NON-PCB	---	___
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	1,800 // 1.80			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			
Cast stone caulk	CSC-2P	Large courtyard	PCB-1016	ND // 0.00	NON-PCB	---	
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	720 // 0.72			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			
Expansion caulk cream	EC-1P	NE Corner of Gym	PCB-1016	ND // 0.00	NON-PCB	---	
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	ND // 0.00			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			
Expansion caulk cream	EC-2P	South side of school	PCB-1016	ND // 0.00	NON-PCB	---	___
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	ND // 0.00			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			

Table 3 - SUMMARY OF CAULK SAMPLE PCB ANALYSES RESULTS
Project "SED RBM @ Somers IS" 240 US-202, Somers, NY 10589

Material	Sample ID #	Material Location	PCB Type	Results [µg/Kg]//[PPM]	PCB or Non-PCB	Material Estimated Quantity	Comments
Expansion caulk gray	EC2-1P	North side of school	PCB-1016	ND // 0.00	NON-PCB	---	___
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	ND // 0.00			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			
Expansion caulk gray	EC2-2P	North side of school	PCB-1016	ND // 0.00	NON-PCB	---	___
			PCB-1221	ND // 0.00			
			PCB-1232	ND // 0.00			
			PCB-1242	ND // 0.00			
			PCB-1248	ND // 0.00			
			PCB-1254	ND // 0.00			
			PCB-1260	ND // 0.00			
			PCB-1262	ND // 0.00			
			PCB-1268	ND // 0.00			

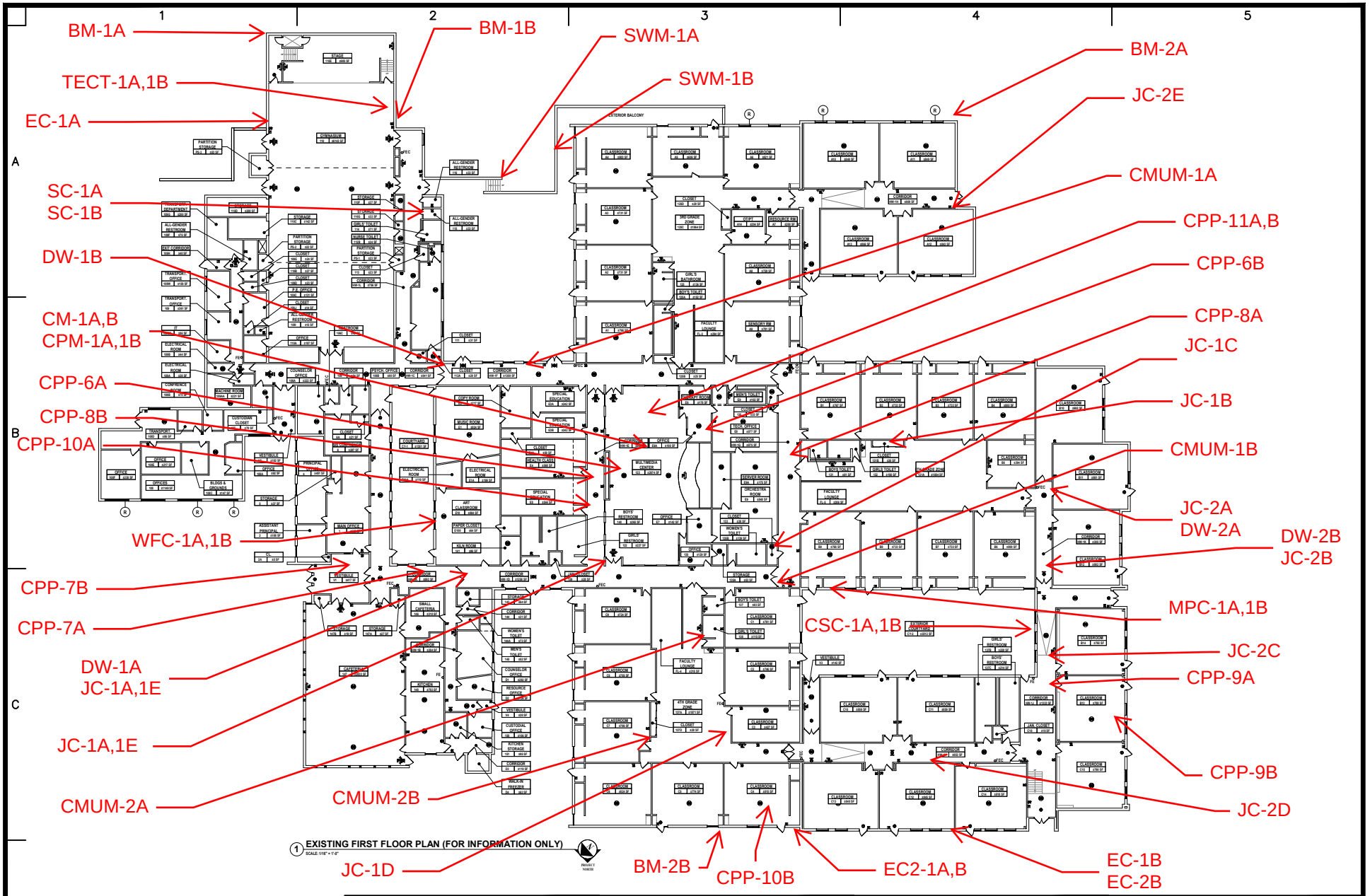
- Not Detected at Reporting/Practical Quantitation Level ---------- = Non-PCB

<50000//50 [µg/Kg]//[PPM] ---------- = Non-PCB

>50000//50 [µg/Kg]//[PPM] ---------- = PCB - Polychlorinated Biphenyls Containing Material

NOTE 1 ---------- Although the activities of the proposed scope of work are not expected to disturb these materials, an allowance has been included to account for their presence within or adjacent to the proposed work areas for informational purposes. These materials shall not be impacted by any project activities and shall be protected.

FIGURES



1 EXISTING FIRST FLOOR PLAN (FOR INFORMATION ONLY)
SCALE: 1/16" = 1'-0"

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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Parsippany, NJ 07054
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NJ Certificate of Authorization No.24GA27996400

Project
SED RBM @ Somers IS

240 US-202
Somers, NY

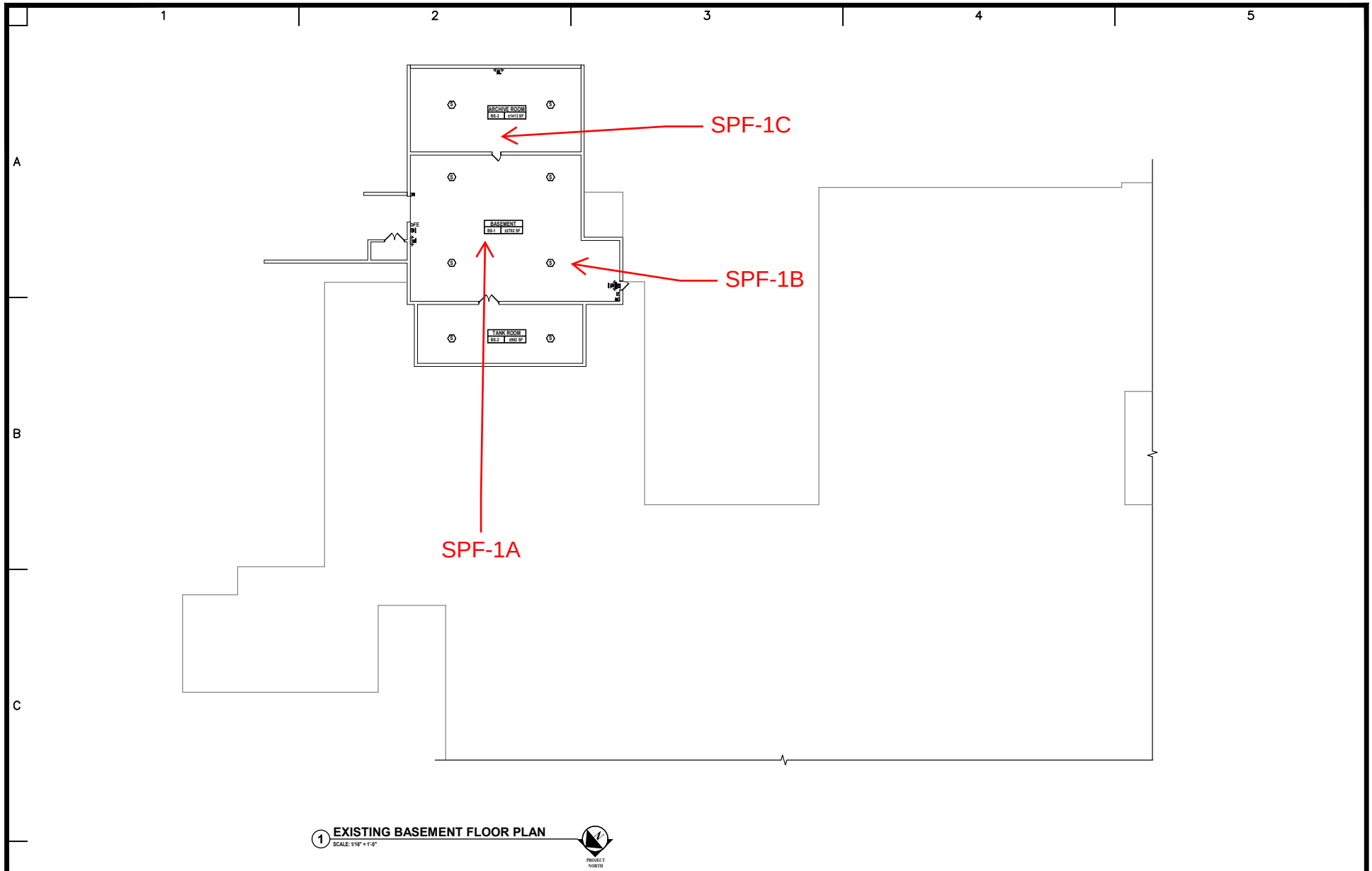
Drawing Title
ASBESTOS SAMPLING LOCATIONS

Project No.	190150514
Date	10/28/2026
Drawn By	M. Benson
Checked By	C. Napolitano

Drawing No.
ASL-01

Sheet 1 of 2

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1 EXISTING BASEMENT FLOOR PLAN
SCALE: 1/16" = 1'-0"

PROJECT NORTH

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.

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Project
SED RBM @ Somers IS

240 US-202
Somers, NY

Drawing Title
ASBESTOS SAMPLING LOCATIONS

Project No. 190150514
Date 10/28/2026
Drawn By M. Benson
Checked By C. Napolitano

Drawing No. ASL-02
Sheet 2 of 2

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A P P E N D I X A

Laboratory Test Results and Chain of Custody Documentations (Asbestos)

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Bulk Asbestos Report by PLM-TEM

Client: Langan
Collected by: Client
Project Name/No.: Somners Intermediate School / 190150514
Project Address: 240 US-202 Somers NY
Work Area:

Lab ID: BK0926484
Date Received: 9/26/2026
PLM Date Analyzed: 9/27/2026
TEM Date Analyzed: 9/30/2026
Report Date: 10/1/2026

Client ID#	Lab ID#	Description/ Location	Analyst Description	ORG %	All %	ASI%	PLM			TEM	Method By ELAP		
							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
CPP-6A	BK0926484-1	1 by 1 Ceiling Tile Rough | 123 Library	Grey, Homogeneous, Non-Fibrous	25.3	43.3	31.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-6B	BK0926484-2	1 by 1 Ceiling Tile Rough | E6A	Grey, Homogeneous, Non-Fibrous	20.4	27.9	51.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-7A	BK0926484-3	2 by 2 Ceiling Tile Textured | HW-1A	Grey, Homogeneous, Non-Fibrous	20.0	61.4	18.5	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-7B	BK0926484-4	2 by 2 Ceiling Tile Textured | Vestibule 1	Grey, Homogeneous, Non-Fibrous	19.1	24.6	56.3	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-8A	BK0926484-5	2 by 4 Ceiling Tile Deep Groove (Old) | HW-1G	Grey, Homogeneous, Non-Fibrous	28.0	16.4	55.6	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-8B	BK0926484-6	2 by 4 Ceiling Tile Deep Groove (Old) | HW-1E	Grey, Homogeneous, Non-Fibrous	22.8	30.3	46.9	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-9A	BK0926484-7	2 by 2 Ceiling Tile Dimples with Pinhole | HW-1J	Grey, Homogeneous, Non-Fibrous	14.6	17.0	68.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-9B	BK0926484-8	2 by 2 Ceiling Tile Dimples with Pinhole | B-13	Grey, Homogeneous, Non-Fibrous	14.5	25.8	59.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-10A	BK0926484-9	2 by 4 Ceiling Tile Deep Grooved (Newer) | HW-1E	Grey, Homogeneous, Non-Fibrous	18.2	74.4	7.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-10B	BK0926484-10	2 by 4 Ceiling Tile Deep Grooved (Newer) | C-4	Grey, Homogeneous, Non-Fibrous	24.6	20.4	54.9	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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Bulk Asbestos Report by PLM-TEM

Client: Langan
Collected by: Client
Project Name/No.: Somners Intermediate School / 190150514
Project Address: 240 US-202 Somers NY
Work Area:

Lab ID: BK0926484
Date Received: 9/26/2026
PLM Date Analyzed: 9/27/2026
TEM Date Analyzed: 9/30/2026
Report Date: 10/1/2026

Client ID#	Lab ID#	Description/ Location	Analyst Description	ORG %	All %	ASI%	PLM			TEM	Method By ELAP		
							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
CPP-11A	BK0926484-11	2 by 2 Ceiling Tile Pinhole | 123 Library	Grey, Homogeneous, Non-Fibrous	21.6	51.5	26.9	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPP-11B	BK0926484-12	2 by 2 Ceiling Tile Pinhole | 123 Library	Grey, Homogeneous, Non-Fibrous	21.4	49.9	28.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CMUM-1A	BK0926484-13	CMU Block Mortar | HW-1D	Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		X		
CMUM-1B	BK0926484-14	CMU Block Mortar | HW-1F	Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		X		
CMUM-2A	BK0926484-15	CMU Block Mortar | 138	Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		X		
CMUM-2B	BK0926484-16	CMU Block Mortar | C7	Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		X		
TECT-1A	BK0926484-17	Tectum Wall Panels | Gym Walls	White, Homogeneous, Friable	Not Applicable			90%CELL	10%	**NAD**		X		
TECT-2A	BK0926484-18	Tectum Wall Panels | Gym Walls	White, Homogeneous, Friable	Not Applicable			90%CELL	10%	**NAD**		X		
BM-1A	BK0926484-19	Brick Mortar - Older Bricks | SE Corner of Gym	Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		X		
BM-1B	BK0926484-20	Brick Mortar - Older Bricks | SE Side of School	Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		X		

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Bulk Asbestos Report by PLM-TEM

Client: Langan
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Project Name/No.: Somners Intermediate School / 190150514
Project Address: 240 US-202 Somers NY
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Client ID#	Lab ID#	Description/ Location	Analyst Description	ORG %	All %	ASI%	PLM			TEM	Method By ELAP		
							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
BM-2A	BK0926484-21	Brick Mortar Newer Bricks | SW Side of School	Grey, Homogeneous, Friable	Not Applicable			0%	100%	NAD		X		
BM-2B	BK0926484-22	Brick Mortar Newer Bricks | NW Side of School	Grey, Homogeneous, Friable	Not Applicable			0%	100%	NAD		X		
SPF-1A	BK0926484-23	Spray on Fireproofing | BS1	Grey, Homogeneous, Friable	Not Applicable			20%CELL	80%	NAD		X		
SPF-1B	BK0926484-24	Spray on Fireproofing | BS1	Grey, Homogeneous, Friable	Not Applicable			20%CELL	80%	NAD		X		
SPF-1C	BK0926484-25	Spray on Fireproofing | BS3	Grey, Homogeneous, Friable	Not Applicable			20%CELL	80%	NAD		X		
DW-1A	BK0926484-26	Drywall Original Vintage | HW-1D	Grey, Homogeneous, Friable	Not Applicable			10%CELL	90%	NAD		X		
DW-1B	BK0926484-27	Drywall Original Vintage | HW-1F	Grey, Homogeneous, Friable	Not Applicable			10%CELL	90%	NAD		X		
JC-1A	BK0926484-28	Joint Compound Original Vintage | HW-1D	Beige, Homogeneous, Friable	Not Applicable			10%CELL	90%	NAD		X		
JC-1B	BK0926484-29	Joint Compound Original Vintage | 131A	White, Homogeneous, Friable	Not Applicable			0%	100%	NAD		X		
JC-1C	BK0926484-30	Joint Compound Original Vintage | 133	White, Homogeneous, Friable	Not Applicable			0%	100%	NAD		X		

Atlas Environmental Lab, Corp.
255 West 36th Street, Suite# 1503
New York, NY 10018
Phone:(212) 563-0400 Fax:(212) 563-0401
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Bulk Asbestos Report by PLM-TEM

Client: Langan
Collected by: Client
Project Name/No.: Somners Intermediate School / 190150514
Project Address: 240 US-202 Somers NY
Work Area:

Lab ID: BK0926484
Date Received: 9/26/2026
PLM Date Analyzed: 9/27/2026
TEM Date Analyzed: 9/30/2026
Report Date: 10/1/2026

Client ID#	Lab ID#	Description/ Location	Analyst Description	ORG %	AII %	ASI%	PLM			TEM	Method By ELAP		
							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
JC-1D	BK0926484-31	Joint Compound Original Vintage | 137A	White, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
JC-1E	BK0926484-32	Joint Compound Original Vintage | HW-1D	White, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
DW-2A	BK0926484-33	Drywall Newer Vintage | HW-1K	Grey, Homogeneous, Friable	Not Applicable			5%CELL 5%FBGL	90%	**NAD**		**X**		
DW-2B	BK0926484-34	Drywall Newer Vintage | HW-1K	Grey, Homogeneous, Friable	Not Applicable			5%CELL 5%FBGL	90%	**NAD**		**X**		
JC-2A	BK0926484-35	Joint Compound Newer Vintage | HW-1K	White, Homogeneous, Friable	Not Applicable			90%CELL	10%	**NAD**		**X**		
JC-2B	BK0926484-36	Joint Compound Newer Vintage | HW-1K	White, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
JC-2C	BK0926484-37	Joint Compound Newer Vintage | HW-1J	White, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
JC-2D	BK0926484-38	Joint Compound Newer Vintage | HW-1L	White, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
JC-2E	BK0926484-39	Joint Compound Newer Vintage | HW-1H	White, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		**X**		
CM-1A	BK0926484-40	Carpet Mastic Yellow | 123 Library	Tan, Homogeneous, Non-Fibrous	41.9	50.8	7.2	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**

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Bulk Asbestos Report by PLM-TEM

Client: Langan
Collected by: Client
Project Name/No.: Somners Intermediate School / 190150514
Project Address: 240 US-202 Somers NY
Work Area:

Lab ID: BK0926484
Date Received: 9/26/2026
PLM Date Analyzed: 9/27/2026
TEM Date Analyzed: 9/30/2026
Report Date: 10/1/2026

Client ID#	Lab ID#	Description/ Location	Analyst Description	ORG %	AII %	ASI%	PLM			TEM	Method By ELAP		
							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
CM-1B	BK0926484-41	Carpet Mastic Yellow | 123 Library	Tan, Homogeneous, Non-Fibrous	29.3	36.0	34.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CPM-1A	BK0926484-42	Carpet Pad Mastic | 123 Library	Brown, Homogeneous, Non-Fibrous	55.0	33.2	11.8	0%	100%	**NAD** Inconclusive	**Trace CHRY**		X	X
CPM-1B	BK0926484-43	Carpet Pad Mastic | 123 Library	Brown, Homogeneous, Non-Fibrous	39.2	55.6	5.3	0%	100%	**NAD** Inconclusive	**Trace CHRY**		X	X
SC-1A	BK0926484-44	Sink Caulk | 115	Grey, Homogeneous, Non-Fibrous	47.7	17.7	34.6	0%	100%	**NAD** Inconclusive	**NAD**		X	X
SC-1B	BK0926484-45	Sink Caulk | 116	Grey, Homogeneous, Non-Fibrous	55.7	41.2	3.1	0%	100%	**NAD** Inconclusive	**NAD**		X	X
SWM-1A	BK0926484-46	Stone Wall Mortar | Stone Wall by South Courtyard	Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		X		
SWM-1B	BK0926484-47	Stone Wall Mortar | Stone Wall by South Courtyard	Grey, Homogeneous, Friable	Not Applicable			0%	100%	**NAD**		X		
CSC-1A	BK0926484-48	Cast Stone Caulk | Large Courtyard	Grey, Homogeneous, Non-Fibrous	70.4	2.2	27.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X
CSC-1B	BK0926484-49	Cast Stone Caulk | Large Courtyard	Grey, Homogeneous, Non-Fibrous	87.9	4.4	7.7	0%	100%	**NAD** Inconclusive	**NAD**		X	X
MPC-1A	BK0926484-50	Metal Panel Caulk | HW-1L	Grey, Homogeneous, Non-Fibrous	24.6	4.0	71.4	0%	100%	**NAD** Inconclusive	**NAD**		X	X

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Bulk Asbestos Report by PLM-TEM

Client: Langan
Collected by: Client
Project Name/No.: Somners Intermediate School / 190150514
Project Address: 240 US-202 Somers NY
Work Area:

Lab ID: BK0926484
Date Received: 9/26/2026
PLM Date Analyzed: 9/27/2026
TEM Date Analyzed: 9/30/2026
Report Date: 10/1/2026

Client ID#	Lab ID#	Description/ Location	Analyst Description	ORG %	AII %	ASI%	PLM			TEM	Method By ELAP		
							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
MPC-1B	BK0926484-51	Metal Panel Caulk | HW-1H	Grey, Homogeneous, Non-Fibrous	18.3	6.0	75.7	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
EC-1A	BK0926484-52	Expansion Caulk Cream | NE Corner of Gym	Grey, Homogeneous, Non-Fibrous	36.6	5.8	57.5	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
EC-1B	BK0926484-53	Expansion Caulk Cream | South Side of School	Grey, Homogeneous, Non-Fibrous	21.1	4.2	74.7	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
EC2-2A	BK0926484-54	Expansion Caulk Gray | North Side of School	Grey, Homogeneous, Non-Fibrous	42.7	10.9	46.4	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
EC2-2B	BK0926484-55	Expansion Caulk Gray | North Side of School	Grey, Homogeneous, Non-Fibrous	29.0	17.1	54.0	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**
MPC-1A	BK0926484-56	VOID											
MPC-2A	BK0926484-57	VOID											
WFC-1A	BK0926484-58	Envelope Caulk Around Window Frames | Small Courtyard	Grey, Homogeneous, Non-Fibrous	23.9	15.6	60.6	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**

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Bulk Asbestos Report by PLM-TEM

Client: Langan
Collected by: Client
Project Name/No.: Somners Intermediate School / 190150514
Project Address: 240 US-202 Somers NY
Work Area:

Lab ID: BK0926484
Date Received: 9/26/2026
PLM Date Analyzed: 9/27/2026
TEM Date Analyzed: 9/30/2026
Report Date: 10/1/2026

Client ID#	Lab ID#	Description/ Location	Analyst Description	ORG %	AII %	ASI%	PLM			TEM	Method By ELAP		
							Fibrous%	Non Fibrous%	Asbestos% &Type	Asbestos% &Type	PLM 198.1	PLM NOB 198.6	TEM 198.4
WFC-1B	BK0926484-59	Envelope Caulk Around Window Frames | Small Courtyard	Grey, Homogeneous, Non-Fibrous	29.8	13.3	56.8	0%	100%	**NAD** Inconclusive	**NAD**		**X**	**X**

TC

Quantitative Analysis (Semi/Full):Bulk Asbestos Analysis-PLM by EPA 600/M4-82-020 per 40 CFR or ELAP198.1 (friable) and 198.6 (NOB) samples for New York.

NAD=no asbestos detected, NA/PS=Not Analyzed/Positive Stop, Trace=<1%,FBGL=Fiberglass, CELL=Cellulose,CHRY=Chrysotile,Amo=Amosite,CRO=Crocidolite,ANTH=Anthophylite, TRE=Tremolite, ACT=Actinolite, NA=not applicable.

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.

All samples were prepared and analyzed in accordance with the EPA "TEM Method for Identifying and Quantifying Asbestos in Non-Fibrous Organically Bound Bulk Samples" ELAP 198.4".

ORG%=Ashed Organic%, AII= Acid Insoluble Inorganic%, ASI= Acid Soluble Inorganic%. The measurement of uncertinty available upon request.

This "Summary of Analytical Results "shall not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, ELAP or any agency of the U.S Government. The results relate only to the items tested. This report may not be reproduced, except in full, without the written approval of AEL .Atlas Environmental lab did not collect the analyzed samples and thus accepts no liability with regard to their collection and/or maintenance . AEL relies on client's data. The liability of Atlas Environmental Lab corp with respect to the services charged, shall in no event exceed the amount of the invoice.

NYS-ELAP#11999, NVLAP Lab Code: 500092-0, CT Reg. ID: PH-0154

PLM Analyst: LB TEM Analyst: MB Approved by:

LANGAN

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

BK0926484

Project Name:	Somners Intermediate School		
Address:	240 US-202 Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:	190150514	Sampling Date:	
Sampled By/License #:	MIKE BENSON 26-61OUA-SHAB		

	Sample ID Number	Description of Sample	Sample Location	Analysis Requested for Asbestos: PLM	PLM-NOB	TEM	Analysis Requested for Lead: AAS	TCLP	Analysis Requested for PCB: EPA Method 8082	Results
1	CPP-6A	1 BY 1 CEILING TILE ROUGH	123 LIBRARY		X	X				
2	CPP-6B	1 BY 1 CEILING TILE ROUGH	E6A		X	X				
3	CPP-7A	2 BY 2 CEILING TILE TEXTURED	HW-1A		X	X				
4	CPP-7B	2 BY 2 CEILING TILE TEXTURED	VESTIBULE 1		X	X				
5	CPP-8A	2 BY 4 CEILING TILE DEEP GROOVE (OLD)	HW-1G		X	X				
6	CPP-8B	2 BY 4 CEILING TILE DEEP GROOVE (OLD)	HW-1E		X	X				
7	CPP-9A	2 BY 2 CEILING TILE DIMPLED WITH PINHOLE	HW-1J		X	X				
8	CPP-9B	2 BY 2 CEILING TILE DIMPLED WITH PINHOLE	B-13		X	X				
9	CPP-10A	2 BY 4 CEILING TILE DEEP GROOVE (NEWER)	HW-1E		X	X				
10	CPP-10B	2 BY 4 CEILING TILE DEEP GROOVE (NEWER)	C-4		X	X				
11	CPP-11A	2 BY 2 CEILING TILE PINHOLE	123 LIBRARY		X	X				
12	CPP-11B	2 BY 2 CEILING TILE PINHOLE	123 LIBRARY		X	X				

Total No. of Samples: 59

Turnaround Request:

6 hours	12 hours	24 hours	48 hours	72 hours	5 days
					X

Laboratory Instructions: Stop analysis @ 1st positive (>1% by weight) for each homogenous sample group.

Email results to dcheskin@langan.com mbenson@langan.com cnapolitano@langan.com

Relinquished By: Mark	Date: 9/25/26	Time: Via Fed Ex	Received by: Tiffany L	Date: 9/26/26	Time: 10:15AM
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by: PCM Leonard B	Date: 9/29/26	Time: 03:00

NOTES:

TEM: MDA - 9.30.26

LANGAN

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

BK0926484

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Project Name:	Somners Intermediate School		
Address:	240 US-202 Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:	190150514	Sampling Date:	
Sampled By/License #:	MIKE BENSON 26-61OUA-SHAB		

	Sample ID Number	Description of Sample	Sample Location	Analysis Requested for Asbestos: PLM	PLM-NOB	TEM	Analysis Requested for Lead: AAS	TCLP	Analysis Requested for PCB: EPA Method 8082	Results
13	CMUM-1A	CMU BLOCK MORTAR	HW-1D	X						
14	CMUM-1B	CMU BLOCK MORTAR	HW-1F	X						
15	CMUM-2A	CMU BLOCK MORTAR	138	X						
16	CMUM-2B	CMU BLOCK MORTAR	C7	X						
17	TECT-1A	TECTUM WALL PANELS	GYM WALLS		X	X				
18	TECT-1B	TECTUM WALL PANELS	GYM WALLS		X	X				
19	BM-1A	BRICK MORTAR - OLDER BRICKS	SE CORNER OF GYM	X						
20	BM-1B	BRICK MORTAR - OLDER BRICKS	SE SIDE OF SCHOOL	X						
21	BM-2A	BRICK MORTAR NEWER BRICKS	SW SIDE OF SCHOOL	X						
22	BM-2B	BRICK MORTAR NEWER BRICKS	NW SIDE OF SCHOOL	X						
23	SPF1A	SPRAY ON FIREPROOFING	BS1	X						
24	SFP-1B	SPRAY ON FIREPROOFING	BS1	X						

Turnaround Request:	6 hours	12 hours	24 hours	48 hours	72 hours	5 days
						X

Total No. of Samples: **59**

Laboratory Instructions: Stop analysis @ 1st positive (>1% by weight) for each homogenous sample group.
Email results to dcheskin@langan.com mbenson@langan.com cnapolitano@langan.com

Relinquished By: [signature]	Date: 9/25/26	Time: Via Fed Ex	Received by: [signature]	Date: 9/26/26	Time: 10:15 AM
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by: Leonardo B	Date: 9/29/26	Time: 03:00

NOTES:

LANGAN

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

BK0926484

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

Project Name:	Somners Intermediate School		
Address:	240 US-202 Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:	190150514	Sampling Date:	
Sampled By/License #:	MIKE BENSON 26-61OUA-SHAB		

	Sample ID Number	Description of Sample	Sample Location	Analysis Requested for Asbestos: PLM	PLM-NOB	TEM	Analysis Requested for Lead: AAS	TCLP	Analysis Requested for PCB: EPA Method 8082	Results
25	SPF-1C	SPRAY ON FIREPROOFING	BS3	X						
26	DW-1A	DRYWALL ORIGINAL VINTAGE	HW-1D	X						
27	DW-1B	DRYWALL ORIGINAL VINTAGE	HW-1F	X						
28	JC-1A	JOINT COMPOUND ORIGINAL VINTAGE	HW-1D	X						
29	JC-1B	JOINT COMPOUND ORIGINAL VINTAGE	131A	X						
30	JC-1C	JOINT COMPOUND ORIGINAL VINTAGE	133	X						
31	JC-1D	JOINT COMPOUND ORIGINAL VINTAGE	137A	X						
32	JC-1E	JOINT COMPOUND ORIGINAL VINTAGE	HW-1D	X						
33	DW-2A	DRYWALL NEWER VINTAGE	HW-1K	X						
34	DW-2B	DRYWALL NEWER VINTAGE	HW-1K	X						
35	JC-2A	JOINT COMPOUND NEWER VINTAGE	HW-1K	X						
36	JC-2B	JOINT COMPOUND NEWER VINTAGE	HW-1K	X						

Turnaround Request:	6 hours	12 hours	24 hours	48 hours	72 hours	5 days
						X

Total No. of Samples: 59

Laboratory Instructions: Stop analysis @ 1st positive (>1% by weight) for each homogenous sample group.
Email results to dcheskin@langan.com mbenson@langan.com cnapolitano@langan.com

Relinquished By:		Date: 9/25/26	Time: Via FedEx	Received by:		Date: 9/26/26	Time: 10:15AM
Relinquished By:		Date:	Time:	Received by:		Date:	Time:
Relinquished By:		Date:	Time:	Received by:	Leonardo B	Date: 9/29/26	Time: 03:00

NOTES:

LANGAN

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

BK0926484

Project Name:	Somners Intermediate School		
Address:	240 US-202 Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:	190150514	Sampling Date:	
Sampled By/License #:	MIKE BENSON 26-61OUA-SHAB		

	Sample ID Number	Description of Sample	Sample Location	Analysis Requested for Asbestos: PLM	PLM-NOB	TEM	Analysis Requested for Lead: AAS	TCLP	Analysis Requested for PCB: EPA Method 8082	Results
37	JC-2C	JOINT COMPOUND NEWER VINTAGE	HW-1J	X						
38	JC-2D	JOINT COMPOUND NEWER VINTAGE	HW-1L	X						
39	JC-2E	JOINT COMPOUND NEWER VINTAGE	HW-1H	X						
40	CM-1A	CARPET MASTIC YELLOW	123 LIBRARY		X	X				
41	CM-1B	CARPET MASTIC YELLOW	123 LIBRARY		X	X				
42	CPM-1A	CARPET PAD MASTIC	123 LIBRARY		X	X				
43	CPM-1B	CARPET PAD MASTIC	123 LIBRARY		X	X				
44	SC-1A	SINK CAULK	115		X	X				
45	SC-1B	SINK CAULK	116		X	X				
46	SWM-1A	STONE WALL MORTER	STONE WALL BY SOUTH COURTYARD	X						
47	SWM-1B	STONE WALL MORTAR	STONE WALL BY SOUTH COURTYARD	X						
48	CSC-1A	CAST STONE CAULK	LARGE COURTYARD		X	X				

6 hours	12 hours	24 hours	48 hours	72 hours	5 days
					X

Total No. of Samples: 59

Turnaround Request:

Laboratory Instructions: Stop analysis @ 1st positive (>1% by weight) for each homogenous sample group.

Email results to dcheskin@langan.com mbenson@langan.com cnapolitano@langan.com

Relinquished By: MBN	Date: 9/25/26	Time: Via Fed Ex	Received by: T Plumi	Date: 9/26/26	Time: 10:15AM
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by: Leonardo B	Date: 9/29/26	Time: 03:00

NOTES:

LANGAN

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST
CORRECTIONS Page 5

BK0926484

Project Name:	Somners Intermediate School		
Address:	240 US-202 Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:	190150514	Sampling Date:	
Sampled By/License #:	MIKE BENSON 26-61OUA-SHAB		

	Sample ID Number	Description of Sample	Sample Location	Analysis Requested for Asbestos: PLM	PLM-NOB	TEM	Analysis Requested for Lead: AAS	TCLP	Analysis Requested for PCB: EPA Method 8082	Results
49	CSC-1B	CAST STONE CAULK	LARGE COURTYARD		X	X				
50	MPC-1A	METAL PANEL CAULK	HW-1L		X	X				
51	MPC-1B	METAL PANEL CAULK	HW-1H		X	X				
52	EC-1A	EXPANSION CAULK CREAM	NE CORNER OF GYM		X	X				
53	EC-1B	EXPANSION CAULK CREAM	SOUTH SIDE OF SCHOOL		X	X				
54	EC2-1A	EXPANSION CAULK GRAY	NORTH SIDE OF SCHOOL		X	X				
55	EC2-1B	EXPANSION CAULK GRAY	NORTH SIDE OF SCHOOL		X	X				
56	MPC-1A	VOID	VOID		X	X				
57	MPC-2A	VOID	VOID		X	X				
58	WFC-1A	ENVELOPE CAULK AROUND WINDOW FRAMES	SMALL COURTYARD		X	X				
59	WFC-1B	ENVELOPE CAULK AROUND WINDOW FRAMES	SMALL COURTYARD		X	X				

Total No. of Samples: 59	Turnaround Request:	6 hours	12 hours	24 hours	48 hours	72 hours	5 days
							X

Laboratory Instructions: Stop analysis @ 1st positive (>1% by weight) for each homogenous sample group.
Email results to dcheskin@langan.com mbenson@langan.com cnapolitano@langan.com

Relinquished By:	Date:	Time:	Received by: Amirali Hurdi	Date: 9/28/26	Time: 12:10
Relinquished By:	Date:	Time:	Received by:	Date:	Time:
Relinquished By:	Date:	Time:	Received by:	Date:	Time:

NOTES:

revised COC

A P P E N D I X B

Laboratory Results and Chain-of-Custody Documentation (PCBs)

PHOENIX
Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19456

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: WFC-1P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1221	ND	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1232	ND	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1242	ND	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1248	ND	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1254	ND	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1260	75000000	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1262	ND	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1268	ND	9400000	ug/Kg	10000	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	Diluted Out		%	10000	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	Diluted Out		%	10000	09/29/26	SC	30 - 150 %
% TCMX	Diluted Out		%	10000	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	Diluted Out		%	10000	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

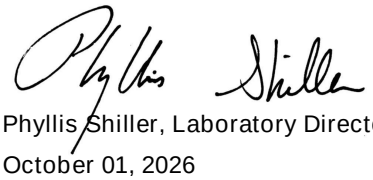
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19457

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: WFC-2P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1221	ND	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1232	ND	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1242	ND	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1248	ND	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1254	ND	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1260	49000000	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1262	ND	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
PCB-1268	ND	12000000	ug/Kg	10000	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	Diluted Out		%	10000	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	Diluted Out		%	10000	09/29/26	SC	30 - 150 %
% TCMX	Diluted Out		%	10000	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	Diluted Out		%	10000	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

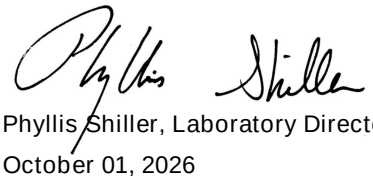
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19458

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: MPC-1P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	11000	ug/Kg	5	09/29/26	SC	SW8082A
PCB-1221	ND	11000	ug/Kg	5	09/29/26	SC	SW8082A
PCB-1232	ND	11000	ug/Kg	5	09/29/26	SC	SW8082A
PCB-1242	ND	11000	ug/Kg	5	09/29/26	SC	SW8082A
PCB-1248	ND	11000	ug/Kg	5	09/29/26	SC	SW8082A
PCB-1254	ND	11000	ug/Kg	5	09/29/26	SC	SW8082A
PCB-1260	61000	11000	ug/Kg	5	09/29/26	SC	SW8082A
PCB-1262	ND	11000	ug/Kg	5	09/29/26	SC	SW8082A
PCB-1268	ND	11000	ug/Kg	5	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	63		%	5	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	60		%	5	09/29/26	SC	30 - 150 %
% TCMX	52		%	5	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	57		%	5	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

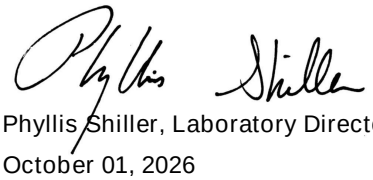
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BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19459

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: MPC-2P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	16000	ug/Kg	10	09/29/26	SC	SW8082A
PCB-1221	ND	16000	ug/Kg	10	09/29/26	SC	SW8082A
PCB-1232	ND	16000	ug/Kg	10	09/29/26	SC	SW8082A
PCB-1242	ND	16000	ug/Kg	10	09/29/26	SC	SW8082A
PCB-1248	ND	16000	ug/Kg	10	09/29/26	SC	SW8082A
PCB-1254	ND	16000	ug/Kg	10	09/29/26	SC	SW8082A
PCB-1260	70000	16000	ug/Kg	10	09/29/26	SC	SW8082A
PCB-1262	ND	16000	ug/Kg	10	09/29/26	SC	SW8082A
PCB-1268	ND	16000	ug/Kg	10	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	61		%	10	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	56		%	10	09/29/26	SC	30 - 150 %
% TCMX	47		%	10	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	54		%	10	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

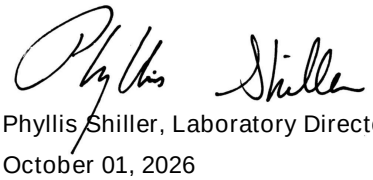
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BRL=Below Reporting Level L=Biased Low
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Comments:

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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19460

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: SC-1P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1221	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1232	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1242	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1248	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1254	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1260	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1262	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1268	ND	680	ug/Kg	1	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	42		%	1	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	31		%	1	09/29/26	SC	30 - 150 %
% TCMX	38		%	1	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	37		%	1	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

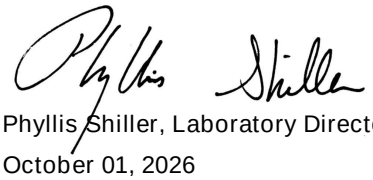
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19461

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: SC-2P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A	
Polychlorinated Biphenyls								
PCB-1016	ND	560	ug/Kg	1	09/29/26	SC	SW8082A	
PCB-1221	ND	560	ug/Kg	1	09/29/26	SC	SW8082A	
PCB-1232	ND	560	ug/Kg	1	09/29/26	SC	SW8082A	
PCB-1242	ND	560	ug/Kg	1	09/29/26	SC	SW8082A	
PCB-1248	ND	560	ug/Kg	1	09/29/26	SC	SW8082A	
PCB-1254	800	560	ug/Kg	1	09/29/26	SC	SW8082A	
PCB-1260	ND	560	ug/Kg	1	09/29/26	SC	SW8082A	
PCB-1262	ND	560	ug/Kg	1	09/29/26	SC	SW8082A	
PCB-1268	ND	560	ug/Kg	1	09/29/26	SC	SW8082A	
QA/QC Surrogates								
% DCBP	37		%	1	09/29/26	SC	30 - 150 %	
% DCBP (Confirmation)	29		%	1	09/29/26	SC	30 - 150 %	3
% TCMX	32		%	1	09/29/26	SC	30 - 150 %	
% TCMX (Confirmation)	33		%	1	09/29/26	SC	30 - 150 %	

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

3 = This parameter exceeds laboratory specified limits.

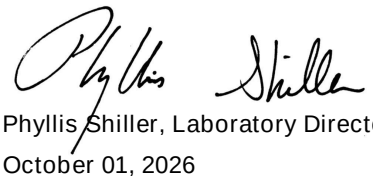
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

PHOENIX
Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19462

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: CSC-1P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	880	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1221	ND	880	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1232	ND	880	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1242	ND	880	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1248	ND	880	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1254	1800	880	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1260	ND	880	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1262	ND	880	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1268	ND	880	ug/Kg	2	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	79		%	2	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	56		%	2	09/29/26	SC	30 - 150 %
% TCMX	70		%	2	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	67		%	2	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

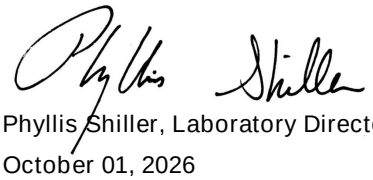
RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19463

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: CSC-2P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	510	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1221	ND	510	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1232	ND	510	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1242	ND	510	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1248	ND	510	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1254	720	510	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1260	ND	510	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1262	ND	510	ug/Kg	2	09/29/26	SC	SW8082A
PCB-1268	ND	510	ug/Kg	2	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	36		%	2	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	34		%	2	09/29/26	SC	30 - 150 %
% TCMX	33		%	2	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	33		%	2	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

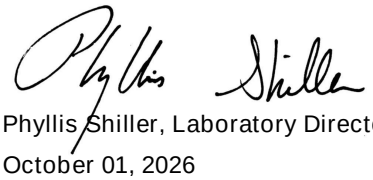
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BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19464

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: EC-1P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1221	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1232	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1242	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1248	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1254	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1260	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1262	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1268	ND	1000	ug/Kg	1	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	37		%	1	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	71		%	1	09/29/26	SC	30 - 150 %
% TCMX	44		%	1	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	51		%	1	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

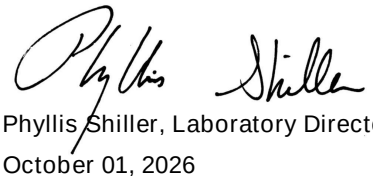
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BRL=Below Reporting Level L=Biased Low
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Comments:

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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19465

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: EC-2P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1221	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1232	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1242	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1248	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1254	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1260	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1262	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1268	ND	770	ug/Kg	1	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	75		%	1	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	38		%	1	09/29/26	SC	30 - 150 %
% TCMX	52		%	1	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	45		%	1	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

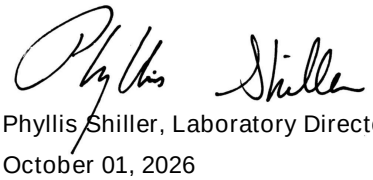
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Phyllis Shiller, Laboratory Director
October 01, 2026
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Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19466

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: EC2-1P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1221	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1232	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1242	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1248	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1254	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1260	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1262	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
PCB-1268	ND	600	ug/Kg	1	09/29/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	57		%	1	09/29/26	SC	30 - 150 %
% DCBP (Confirmation)	35		%	1	09/29/26	SC	30 - 150 %
% TCMX	49		%	1	09/29/26	SC	30 - 150 %
% TCMX (Confirmation)	42		%	1	09/29/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

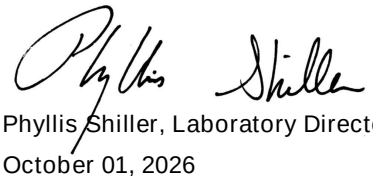
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October 01, 2026
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Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

Analysis Report

October 01, 2026

FOR: Attn: Craig Napolitano
Langan Engineering & Environmental Svcs
300 Kimball Drive
4th Floor
Parsippany NJ 07054

Sample Information		Custody Information		Date	Time
Matrix:	CAULK	Collected by:	MB	09/25/26	
Location Code:	LANGANNJ	Received by:	SR1	09/28/26	12:05
Rush Request:	5 Day	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCX19456
Phoenix ID: CX19467

Project ID: 190150514 SOMNERS INTERMEDIATE SCHOOL
Client ID: EC2-2P

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Caulk Extraction for PCB	Completed				09/28/26	R/NG	SW3545A
Polychlorinated Biphenyls							
PCB-1016	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
PCB-1221	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
PCB-1232	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
PCB-1242	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
PCB-1248	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
PCB-1254	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
PCB-1260	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
PCB-1262	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
PCB-1268	ND	830	ug/Kg	1	09/30/26	SC	SW8082A
QA/QC Surrogates							
% DCBP	53		%	1	09/30/26	SC	30 - 150 %
% DCBP (Confirmation)	68		%	1	09/30/26	SC	30 - 150 %
% TCMX	53		%	1	09/30/26	SC	30 - 150 %
% TCMX (Confirmation)	54		%	1	09/30/26	SC	30 - 150 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

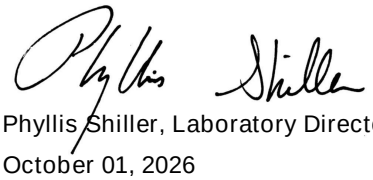
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Phyllis Shiller, Laboratory Director
October 01, 2026
Official Report Release To Follow

Sample Criteria Exceedances Report

GCX19456 - LANGANNJ

Criteria: None

State: NY

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CX19456	$PCB_SMR	PCB-1268	NY / Requested PCB RL /	ND	9400000	1000	1000	ug/Kg
CX19456	$PCB_SMR	PCB-1221	NY / Requested PCB RL /	ND	9400000	1000	1000	ug/Kg
CX19456	$PCB_SMR	PCB-1232	NY / Requested PCB RL /	ND	9400000	1000	1000	ug/Kg
CX19456	$PCB_SMR	PCB-1242	NY / Requested PCB RL /	ND	9400000	1000	1000	ug/Kg
CX19456	$PCB_SMR	PCB-1248	NY / Requested PCB RL /	ND	9400000	1000	1000	ug/Kg
CX19456	$PCB_SMR	PCB-1254	NY / Requested PCB RL /	ND	9400000	1000	1000	ug/Kg
CX19456	$PCB_SMR	PCB-1260	NY / Requested PCB RL /	75000000	9400000	1000	1000	ug/Kg
CX19456	$PCB_SMR	PCB-1262	NY / Requested PCB RL /	ND	9400000	1000	1000	ug/Kg
CX19456	$PCB_SMR	PCB-1016	NY / Requested PCB RL /	ND	9400000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1262	NY / Requested PCB RL /	ND	12000000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1260	NY / Requested PCB RL /	49000000	12000000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1254	NY / Requested PCB RL /	ND	12000000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1248	NY / Requested PCB RL /	ND	12000000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1242	NY / Requested PCB RL /	ND	12000000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1232	NY / Requested PCB RL /	ND	12000000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1016	NY / Requested PCB RL /	ND	12000000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1268	NY / Requested PCB RL /	ND	12000000	1000	1000	ug/Kg
CX19457	$PCB_SMR	PCB-1221	NY / Requested PCB RL /	ND	12000000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1268	NY / Requested PCB RL /	ND	11000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1232	NY / Requested PCB RL /	ND	11000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1242	NY / Requested PCB RL /	ND	11000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1248	NY / Requested PCB RL /	ND	11000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1254	NY / Requested PCB RL /	ND	11000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1260	NY / Requested PCB RL /	61000	11000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1262	NY / Requested PCB RL /	ND	11000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1221	NY / Requested PCB RL /	ND	11000	1000	1000	ug/Kg
CX19458	$PCB_SMR	PCB-1016	NY / Requested PCB RL /	ND	11000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1268	NY / Requested PCB RL /	ND	16000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1262	NY / Requested PCB RL /	ND	16000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1260	NY / Requested PCB RL /	70000	16000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1254	NY / Requested PCB RL /	ND	16000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1248	NY / Requested PCB RL /	ND	16000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1242	NY / Requested PCB RL /	ND	16000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1232	NY / Requested PCB RL /	ND	16000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1016	NY / Requested PCB RL /	ND	16000	1000	1000	ug/Kg
CX19459	$PCB_SMR	PCB-1221	NY / Requested PCB RL /	ND	16000	1000	1000	ug/Kg
CX19462	$PCB_SMR	PCB-1254	NY / Requested PCB RL /	1800	880	1000	1000	ug/Kg

Sample Criteria Exceedances Report

GCX19456 - LANGANNJ

Criteria: None

State: NY

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

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.

LANGAN

300 Kimball Drive
Parsippany, NJ 07054
Phone: 973-560-4900
Fax: 973-560-4901

CHAIN OF CUSTODY RECORD / ANALYSIS REQUEST

20.9°

Project Name:	Somners Intermediate School		
Address:	240 US-202 Somers NY	Auth. By:	Craig Napolitano
		Phone No:	646-210-6500
Langan Job No.:	190150514	Sampling Date:	
Sampled By/License #:	MIKE BENSON 26-61OUA-SHAB		

Sample ID Number	Description of Sample	Sample Location	Analysis Requested for Asbestos: PLM	PLM-NOB	TEM	Analysis Requested for Lead: AAS	TCLP	Analysis Requested for PCB: EPA Method 8082	Results
WFC-1P	ENVELOPE CAULK AROUND WINDOW FRAMES	SMALL COURTYARD						X	19456
WFC-2P	ENVELOPE CAULK AROUND WINDOW FRAMES	SMALL COURTYARD						X	19457
MPC-1P	METAL PANEL CAULK	LARGE COURTYARD						X	19458
MPC-2P	METAL PANEL CAULK	LARGE COURTYARD						X	19459
SC-1P	SINK CAULK	115						X	19460
* SC-1P	SINK CAULK	116						X	19461
CSC-1P	CAST STONE CAULK	LARGE COURTYARD						X	19462
CSC-2P	CAST STONE CAULK	LARGE COURTYARD						X	19463
EC-1P	EXPANSION CAULK CREAM	NE CORNER OF GYM						X	19464
(1) EC-1P	EXPANSION CAULK CREAM	SOUTH SIDE OF SCHOOL						X	19465
(2) EC2-2P	EXPANSION CAULK GRAY	NORTH SIDE OF SCHOOL						X	19466
EC2-2P	EXPANSION CAULK GRAY	NORTH SIDE OF SCHOOL						X	19467

Total No. of Samples:	12	Turnaround Request:	6 hours	12 hours	24 hours	48 hours	72 hours	5 days
								X

Laboratory Instructions: Stop analysis @ 1st positive (>1% by weight) for each homogenous sample group.
Email results to dcheskin@langan.com mbenson@langan.com cnapolitano@langan.com

Relinquished By:	Date:	Time:	Received by:	Date:	Time:
[signature]	9/26/26	1/a Fed Ex			
Relinquished By: Fed Ex	Date:	Time:	Received by: Stacy Gibbons	Date: 9/28/26	Time: 12:05
Relinquished By:	Date:	Time:	Received by:	Date:	Time:

NOTES: * Sample labeled SC-2P (Sp) (1) Sample labeled EC-2P (Sp) (2) Sample labeled EC2-1P (Sp)

A P P E N D I X C

Langan's Certifications and Laboratory Accreditations

NEW YORK STATE | Department of Labor

WORKING FOR YOU

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: 03/18/2026
Expiration Date: 03/31/2027
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.

Vicki Mockler, Director
For the Commissioner of Labor

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 July 15, 2027

LBP-2233-3
Certification #

July 01, 2024
Issued On

Marc Edmonds, Chief
Risk Assessment Management Branch 2.

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



MICHAEL BENSON SR
CLASS(EXPIRES)
C ATEC (12/26) D INSP (12/26)
I PD (12/26) H PM (12/26)

CERT# 26-610UA-SHAB
DMV# 987083458

MUST BE CARRIED ON ASBESTOS PROJECTS

United States Environmental Protection Agency

This is to certify that



Michael R Benson

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 July 04, 2029

LBP-R-I337069-1

Certification #

June 20, 2026

Issued On

Ben Conetta, Manager

Chemicals and Multimedia Programs Branch

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S



ANDREW CHESKIN
CLASS(EXPIRES)
C ATEC (09/27) I PD (09/27)
H PM (09/27) D INSP (09/27)
E MGPL (09/27)

CERT# 26-61X9V-SHAB
DMV# 304231776

MUST BE CARRIED ON ASBESTOS PROJECTS

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, 2027

LBP-R-11931-3

Certification #

July 08, 2024

Issued On

Ben Conetta, Manager

Chemicals and Multimedia Programs Branch

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2027
Issued April 01, 2026

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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

MS. JACKIE DARVISH
ATLAS ENVIRONMENTAL LABS CORP
255 W 36TH STREET SUITE 1503
NEW YORK, NY 10018

NY Lab Id No: 11999

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

Miscellaneous

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

Sample Preparation Methods

EPA 3050B

Serial No.: 72361

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.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2027
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ATLAS ENVIRONMENTAL LABS CORP
255 W 36TH STREET SUITE 1503
NEW YORK, NY 10018

NY Lab Id No: 11999

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

Metals I

Lead, Total	NIOSH 7082

Miscellaneous

Asbestos	40 CFR 763 APX A No. III
	NIOSH 7402
Fibers	NIOSH 7400 A RULES

Serial No.: 72362

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.

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 500092-0

Atlas Environmental Lab (Asbestos in Bulk)

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 on ISO/IEC 17025).

2025-10-01 through 2026-09-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Atlas Environmental Lab (Asbestos in Bulk)
255 W 36th Street Suite #1503
New York, NY 10018
Ms. Jackie Darvish
Phone: 212-563-0400 Fax: 212-563-0401
Email: jdarvish@atlasenvironmentallab.com
http://www.atlasenvironmentallab.com

ASBESTOS FIBER ANALYSIS **NVLAP LAB CODE 500092-0**

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

Effective 2025-10-01 through 2026-09-30

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 500092-0

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2026-10-01 through 2027-09-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2027
Issued April 01, 2026

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:

Petroleum Hydrocarbons	
Gasoline Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 625.1
	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 625.1
	EPA 8270E
Diethyl phthalate	EPA 625.1
	EPA 8270E
Dimethyl phthalate	EPA 625.1
	EPA 8270E
Di-n-butyl phthalate	EPA 625.1
	EPA 8270E
Di-n-octyl phthalate	EPA 625.1
	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
Aroclor 1254 (PCB-1254)	EPA 8082A

Serial No.: 72070

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, 2027
Issued April 01, 2026

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All approved analytes are listed below:

Polychlorinated Biphenyls

Aroclor 1254 (PCB-1254)	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
PCB 87	EPA 8082A

Serial No.: 72070

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A P P E N D I X D

File Search/Archive Materials (available upon request)
Scope of Work Drawings

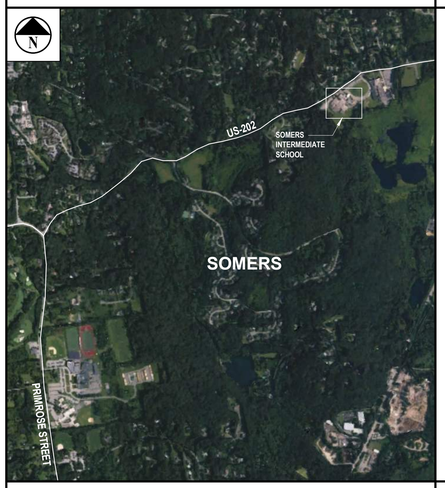
SOMERS CENTRAL SCHOOL DISTRICT
VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

CONTRACT G - GENERAL CONSTRUCTION
CONTRACT C - CIVIL CONSTRUCTION
CONTRACT P - PLUMBING CONSTRUCTION
CONTRACT M - MECHANICAL CONSTRUCTION
CONTRACT E - ELECTRICAL CONSTRUCTION

SED #: 66-21-01-06-0-006-021

LOCATION MAP



SYMBOLS LEGEND

BRICK
BATT INSULATION
ROOM NAME / ROOM / 000 / ± S.F. / ROOM NUMBER / AREA — ROOM NUMBER DESIGNATION TAG
A — WINDOW ELEVATION KEY
1i — WALL TYPE
ACOUSTIC TILE / CERAMIC TILE
RIGID INSULATION
1 Title SCALE: 1/8" = 1'-0" — DRAWING TITLE
0 — COLUMN GRID
CONCRETE
GYPSUM BOARD
XX — REVISION TAG
1001A / 1001A — DOOR NUMBER
CONCRETE BLOCK
PLYWOOD
12'-0" — PRIMARY CEILING HEIGHT TAG
9'-0" A.F.F. — SECONDARY CEILING HEIGHT TAG
EARTH
WOOD BLOCKING
1 / A 101 — EXTERIOR ELEVATION
A / A 101 / A — INTERIOR ELEVATION
STEEL
WOOD
1 / A 101 — SECTION CUT
Ref / 1 / FAD 100 — DETAIL KEY

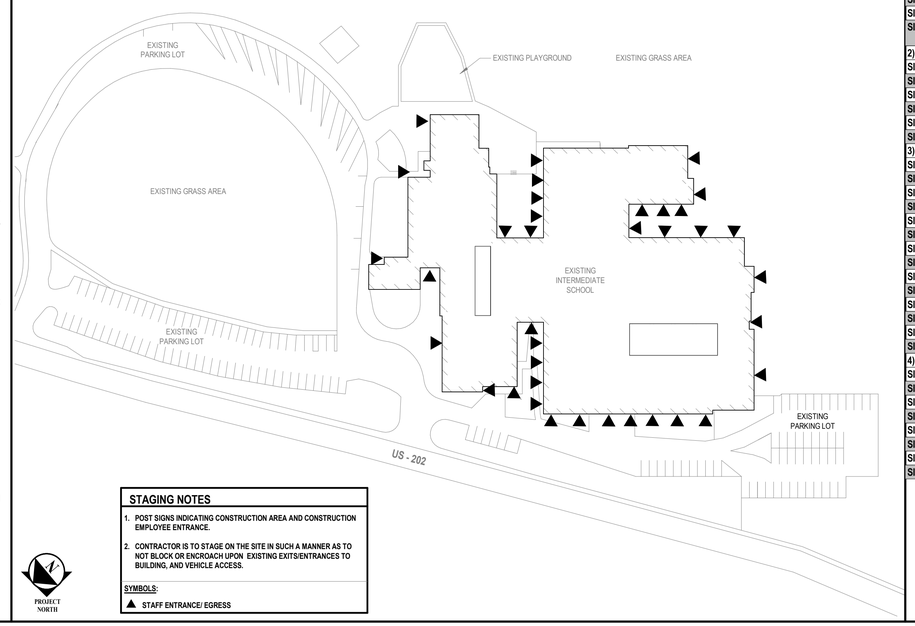
ABBREVIATIONS

AB	ANCHOR BOLT	DS	DOWN SPOUT	NIC	NOT IN CONTRACT
A/C	AIR CONDITIONING	DW	DISHWASHER	NTS	NOT TO SCALE
ACI	AMERICAN CONCRETE INSTITUTE	DWG	DRAWING	OC	ON CENTER
ACT	ACOUSTICAL CEILING TILE	EA	EACH	OD	OUTSIDE DIAMETER
ACU	AIR CONDITIONING UNIT	EL	ELEVATION	PLYWD	PLYWOOD
ADJ	ADJUSTABLE	ELEC	ELECTRIC/ELECTRICAL	PSF	POUNDS PER SQUARE FOOT
A/E	ARCHITECT/ENGINEER	ELEV	ELEVATOR	PSI	POUNDS PER SQUARE INCH
AFF	ABOVE FINISH FLOOR	EP	ELECTRICAL PANEL	PTD	PAINTED
ALUM	ALUMINUM	EPY	EPOXY COATING	PVC	POLYVINYL CHLORIDE
ANCH	ANCHOR	EQ	EQUAL	R	RADIUS OR RISER
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	EQUIP	EQUIPMENT	RCP	REFLECTED CEILING PLAN
APA	ACCESS PANEL	EXIST	EXISTING	RD	ROOF DRAIN
APPROX	APPROXIMATELY	EXST	EXHAUST	REINF	REINFORCED
ASPH	ASPHALT	FAI	FRESH AIR INTAKE	RM	ROOM
ASTM	AMERICAN SOCIETY FOR TESTING & MATERIALS	F.A.S.	FALL ARREST SYSTEM	RO	ROUGH OPENING
AWS	AMERICAN WELDING SOCIETY	F.C.	FIRE CODE	SIM	SIMILAR
B	FIRE BLANKET	FD	FLOOR DRAIN	SPEC	SPECIFICATIONS
BAL	BALANCE	FIN	FINISH	SQ	SQUARE
BB	BULLETIN BOARD	FR	FIRE RATED	SS	STAINLESS STEEL
BD	BOARD	FTG	FOOTING	STL	STEEL
BLDG	BUILDING	GA	GAUGE	TEMP	TEMPERATURE
BLK	BLOCK	GWB	GYPSUM WALL BOARD	TER	TERRAZZO
BLKG	BLOCKING	GYP	GYPSUM	THK	THICK
BM	BEAM	FYP. BD.	GYPSUM BOARD	T.O.	TOP OF
B.O.	BOTTOM OF	HC	HANDICAPPED	TYP	TYPICAL
BOL	BOTTOM OF LINTEL	HM	HOLLOW METAL	UTIL	UTILITY
BOT	BOTTOM	HOR	HORIZONTAL	VB	VAPOR BARRIER
CEIL	CEILING	HW	HOT WATER	VCT	VINYL COMPOSITION TILE
CEM	CEMENT	INSUL	INSULATION/INSULATING	VTR	VENT THRU ROOF
CER	CERAMIC	INT	INTERIOR	WC	WATER CLOSET
CLO	CLOSET	LAV	LAVATORY	WH	WATER HEATER
CMU	CONCRETE MASONRY UNIT	LDR	LEADER	WWF	WELDED WIRE FABRIC
COL	COLUMN	LT	LIGHT		
CONC	CONCRETE	MAX	MAXIMUM		
CONST	CONSTRUCTION	MECH	MECHANICAL		
CONT	CONTINUOUS	MFR	MANUFACTURER		
CORR	CORRIDOR	MISC	MISCELLANEOUS		
CPT	CARPET	MO	MASONRY OPENING		
		MR	MOISTURE RESISTANT		

GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH THE NEW YORK STATE FIRE PREVENTION AND BUILDING CODE AS WELL AS THE NEW YORK STATE EDUCATION DEPARTMENT MANUAL OF PLANNING STANDARDS.
2. ALL NOTES APPEARING HEREIN, WITH THOSE ON VARIOUS DRAWINGS SHALL APPLY TO ALL DRAWINGS AND FORM PART OF THE CONTRACT DOCUMENTS.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL DIMENSIONS, SQUARE FOOTAGES, LOCATIONS AND QUANTITIES OF ALL ITEMS AND/OR SPACES WHETHER INDICATED IN THE DRAWINGS OR NOT.
4. DO NOT SCALE MEASURE ANY DRAWING. VERIFY THE FIGURES, DIMENSIONS AND DESIGN INTENTION SHOWN ON THE DRAWINGS BEFORE BEGINNING LAYOUT OF THE WORK AND REPORT ANY ERRORS, INACCURACIES, OR CONFLICTS TO THE ARCHITECT/ENGINEER IN WRITING BEFORE BEGINNING ANY WORK.
5. ALL WORK SHALL COMPLY WITH ALL APPLICABLE CODES, LAWS AND STATUTES AS REQUIRED. STRICTLY ADHERE TO MANUFACTURER'S PRINTED INSTRUCTIONS.
6. VERIFY EXACT LAYOUT COMPATIBILITY WITH ALL EXISTING CONDITIONS BEFORE BEGINNING WORK.
7. DISTURB ONLY THOSE AREAS OF THE SITE AFFECTED BY RENOVATION, UNLESS NOTED OTHERWISE. PROTECT ALL OTHER AREAS. CONTRACTORS SHALL BE RESPONSIBLE FOR ALL PATCH AND REPAIR OF EXISTING FINISHES WHICH ARE DAMAGED DURING CONSTRUCTION.
8. EACH CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF ANSI ICC A117.1 AND PROVIDE WHERE APPLICABLE ADA COMPLIANT BUILDING COMPONENTS.
9. THE OWNER RESERVES THE RIGHT AT ALL TIMES TO DELIVER, PLACE AND INSTALL EQUIPMENT AND FURNISHINGS AS THE WORK PROGRESSES SO LONG AS THERE IS NOT A CONFLICT WITH THE CONTRACTORS.
10. THE CONTRACTOR SHALL MAINTAIN, AT THE SITE, ONE RECORD COPY OF ALL DRAWINGS, SPECIFICATIONS AND APPROVED SHOP DRAWINGS AND APPROVED SAMPLES MARKED CURRENTLY TO RECORD ALL CHANGES DURING CONSTRUCTION.
11. ANY CHANGES TO THE SCOPE OF WORK OR IN THE CONSTRUCTION DETAILS, WHETHER DUE TO FIELD CONDITIONS OR OMISSION SHALL BE DOCUMENTED BY THE ARCHITECT PRIOR TO EXECUTION. ANY INCREASE OR DECREASE IN THE CONTRACT PRICE MUST BE APPROVED IN WRITING PRIOR TO EXECUTION.
12. THE CONTRACTOR BY PRESENTING THEIR BID FOR THE WORK, REPRESENTS THAT THEY HAVE INSPECTED THE SITE AND IS COMPLETELY FAMILIAR WITH THE SCOPE OF WORK AND ALL FIELD CONDITIONS RELATED TO, AND AFFECTING THE WORK AND ITS PERFORMANCE. EXCEPTIONS AFFECTING THE WORK AND ITS PERFORMANCE, OR CONFLICTS BETWEEN FIELD CONDITIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT / ENGINEER PRIOR TO THE SUBMISSION OF BIDS. FAILURE TO DO SO WILL NOT RESULT IN A CHANGE TO THE CONTRACT PRICE IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO PROVIDE ALL NECESSARY ACCOMMODATIONS TO COMPLETE THE SCOPE OF WORK.
13. CONTRACTORS SHALL POST A COPY OF THE PERMIT ISSUED BY THE N.Y.S. EDUCATION DEPARTMENT DURING THE ENTIRE DURATION OF PROJECT.
14. FOLLOW MANUFACTURER RECOMMENDATIONS FOR ALL HARDWARE AND FASTENERS INTO TREATED WOODS AND METALS.

STAGING PLAN (N.T.S.)



STAGING NOTES

1. POST SIGNS INDICATING CONSTRUCTION AREA AND CONSTRUCTION EMPLOYEE ENTRANCE.
2. CONTRACTOR IS TO STAGE ON THE SITE IN SUCH A MANNER AS TO NOT BLOCK OR ENCROACH UPON EXISTING EXITS/ENTRANCES TO BUILDING, AND VEHICLE ACCESS.

SYMBOLS:
▲ STAFF ENTRANCE/ EGRESS

DRAWING LIST

1) GENERAL		5) ELECTRICAL	
SI-G 000	COVER SHEET	SI-E 001.00	LEGENDS
SI-G 100	EXISTING FIRST FLOOR PLAN | (FOR INFORMATION ONLY)	SI-ES 100.00	SITE PLAN
SI-G 101	CODE COMPLIANCE INFORMATION AND EXISTING BASEMENT PLAN | (FOR INFORMATION ONLY)	SI-ED100.00	FIRST FLOOR DEMOLITION PLAN
		SI-ED101.00	ROOF DEMOLITION PLAN
2) CIVIL		SI-E 100.00	FIRST FLOOR NEW WORK PLAN
SI-C 000.00	GENERAL NOTES AND LEGENDS	SI-E 101.00	ROOF NEW WORK PLAN
SI-CD 100.00	EXISTING CONDITIONS AND DEMOLITION PLAN	SI-E 500.00	DETAILS
SI-CS 100.00	SITE IMPROVEMENTS PLAN	SI-FA 001.00	FIRE ALARM LEGENDS
SI-C 500.00	SITE DETAILS	SI-FAD 100.00	FIRST FLOOR FIRE ALARM DEMOLITION PLAN
SI-C 501.00	SITE DETAILS	SI-FAD 101.00	BASEMENT FIRE ALARM DEMOLITION PLAN
SI-C 502.00	SITE DETAILS	SI-FA 100.00	FIRST FLOOR FIRE ALARM PLAN
3) ARCHITECTURE		SI-FA 101.00	BASEMENT FIRE ALARM NEW WORK PLAN
SI-AD 100	FIRST FLOOR DEMOLITION PLAN	SI-FA 500.00	FIRE ALARM RISER AND NOTES
SI-AD 120	FIRST FLOOR REFLECTED CEILING DEMOLITION PLAN		
SI-AD 430	RESTROOM UPGRADES DEMOLITION PLAN		
SI-A 100	FIRST FLOOR PLAN		
SI-A 120	FIRST FLOOR REFLECTED CEILING PLAN		
SI-A 200	BUILDING ELEVATIONS		
SI-A 201	BUILDING ELEVATIONS		
SI-A 202	BUILDING ELEVATIONS		
SI-A 400	ENLARGED DEMO & PROPOSED OUTDOOR LEARNING SPACE PLANS		
SI-A 401	ENLARGED MULTIMEDIA CENTER PLAN AND REFLECTED CEILING PLAN		
SI-A 430	RESTROOM UPGRADES PROPOSED PLAN		
SI-A 431	RESTROOM UPGRADES DETAILS AND SCHEDULES		
SI-A 500	ARCHITECTURAL DETAILS		
SI-A 610	WINDOW SCHEDULE AND DETAILS		
4) MECHANICAL			
SI-M 001.00	GENERAL NOTES, LEGENDS, AND ABBREVIATIONS		
SI-MD 110.00	FIRST FLOOR DEMOLITION PLAN		
SI-MD 111.00	FIRST FLOOR DEMOLITION PLAN		
SI-MD 112.00	ROOF DEMOLITION PLAN		
SI-M 110.00	FIRST FLOOR NEW WORK PLAN		
SI-M 111.00	ROOF NEW WORK PLAN		
SI-M 600.00	DETAILS AND CONTROL DIAGRAMS		
SI-M 601.00	SCHEDULES		

H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, NY 10605
914.358.5623 • www.h2m.com
NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0016178

CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT — KATRINA PACHECO — 041183 — STATE OF NEW YORK

09/30/2029
Exp. Date

KATRINA N. PACHECO, R.A.
NY PROFESSIONAL ARCHITECT LIC. No. 041183

"IN ACCORDANCE WITH ARTICLE 145, SECTION 7209 OF THE NYS EDUCATION LAW, ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL."

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
L. RAUSCHER	L. RAUSCHER	S.MANDIC	L. FEELEY

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT
ALL CONTRACTS

STATUS
SED SUBMISSION

SHEET TITLE
COVER SHEET

DRAWING No.
SI-G 000.00

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7/21/2026 11:24:46 AM

LEGEND

FE / FEC	EXISTING FIRE EXTINGUISHER
F	EXISTING PULL STATION
ST	EXISTING FIRE ALARM STROBE
H	EXISTING HORN / STROBE COMBO
H	EXISTING FIRE ALARM HORN
B	EXISTING FIRE ALARM BELL
AED	EXISTING AUTOMATED EXTERNAL DEFIBRILLATOR
SD	EXISTING SMOKE DETECTOR
	EXISTING EXIT SIGN
EL	EXISTING EMERGENCY LIGHTING
EX EL	EXISTING EXIT SIGN AND EMERGENCY LIGHTING
R	INDICATES EXISTING RESCUE WINDOW LOCATIONS

1 **EXISTING FIRST FLOOR PLAN (FOR INFORMATION ONLY)**
SCALE: 1/16" = 1'-0"

PROJECT NORTH

H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, NY 10605
914.358.5623 • www.h2m.com
NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

Katrina N. Pacheco 09/30/2029
KATRINA N. PACHECO, R.A.
NY PROFESSIONAL ARCHITECT Lic. No. 041183 Exp. Date

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
L. RAUSCHER	L. RAUSCHER	S.MANDIC	-

PROJECT No:	DATE:	SCALE:
SMSD2505	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

ALL CONTRACTS

STATUS

SED SUBMISSION

SHEET TITLE

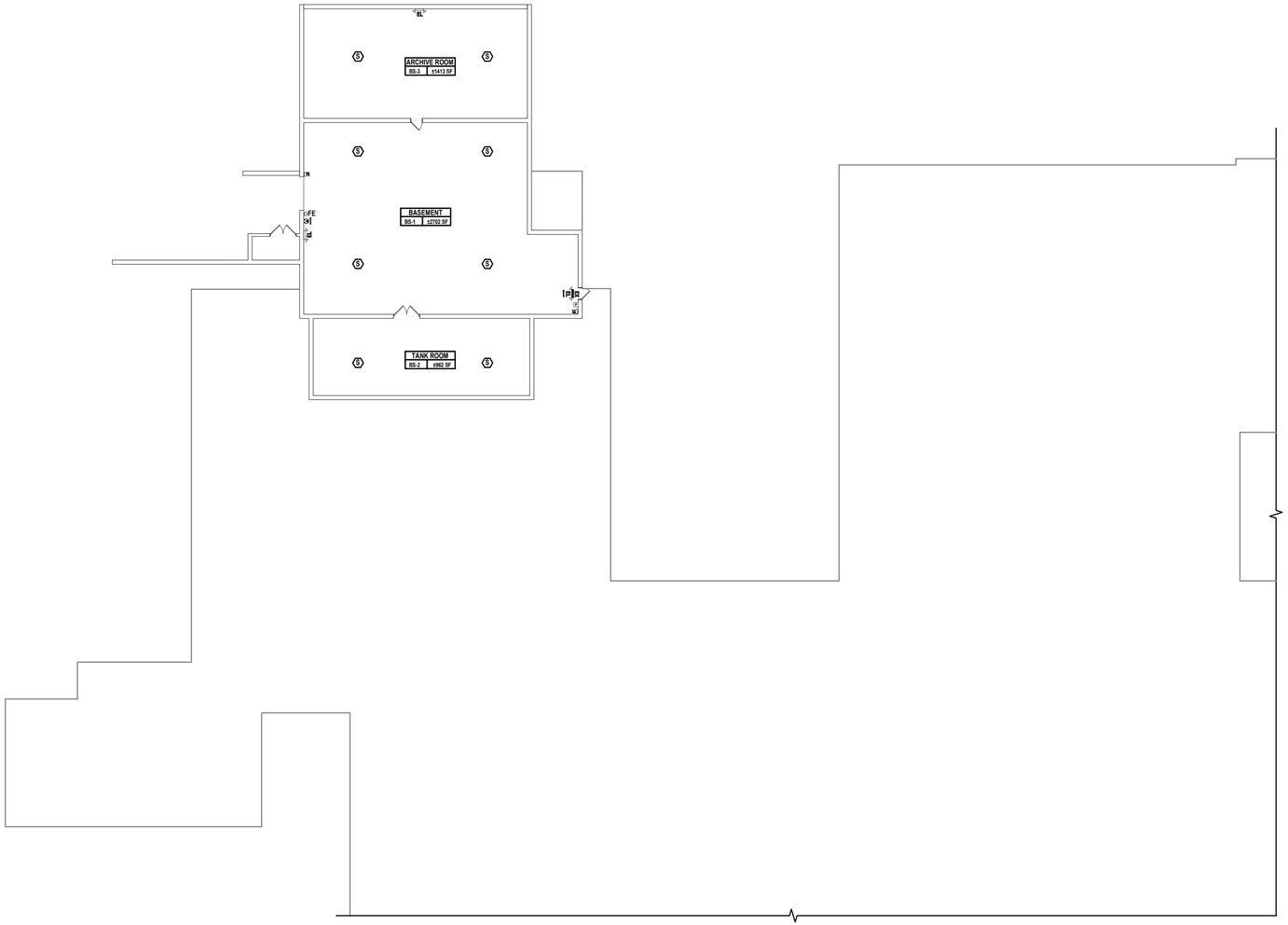
EXISTING FIRST FLOOR PLAN (FOR INFORMATION ONLY)

DRAWING No.

SI-G 100.00

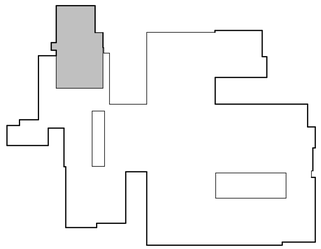
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7/21/2026 11:06:27 AM



1 **EXISTING BASEMENT FLOOR PLAN**
SCALE: 1/16" = 1'-0"

PROJECT NORTH



2 **KEY PLAN- BASEMENT**
SCALE: 1" = 100'-0"

PROJECT NORTH

BUILDING CODE OF NEW YORK STATE (EXISTING BUILDING CODE OF NYS TABLE 504.3 & 504.4)

	EXISTING	ALLOWED	PROPOSED
BUILDING OCCUPANCY	EDUCATIONAL (GROUP E)	EDUCATIONAL (GROUP E)	NO CHANGE
CONSTRUCTION CLASSIFICATION	IIB	IIB	NO CHANGE
HEIGHT (STORIES)	2	2	NO CHANGE
HEIGHT (FEET)	± 27	55	NO CHANGE

APPLICABLE BUILDING CODES

- NEW YORK STATE EDUCATION DEPARTMENT MANUAL OF PLANNING STANDARDS 2026
- 2025 EXISTING BUILDING CODE OF NEW YORK STATE
- 2025 FIRE CODE OF NEW YORK STATE
- 2025 MECHANICAL CODE OF NEW YORK STATE
- 2025 PLUMBING CODE OF NEW YORK STATE
- 2025 FUEL GAS CODE OF NEW YORK STATE
- 2025 ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE
- NFPA 70 - NATIONAL ELECTRICAL CODE - 2023 EDITION
- ACCESSIBLE BUILDINGS ICC/ANSI A117.1- 2017 EDITION
- AMERICAN WITH DISABILITIES ACT

2025 EXISTING BUILDING CODE OF NEW YORK STATE COMPLIANCE & PROJECT SCOPE

ALTERATION - LEVEL 1

EBCNYS CHAPTER 6 - CLASSIFICATION OF WORK

SECTION 602- ALTERATION - LEVEL 1
602.1 SCOPE: LEVEL 1 ALTERATIONS INCLUDE THE REMOVAL AND REPLACEMENT OR THE COVERING OF EXISTING MATERIALS ELEMENTS, EQUIPMENT, OR FIXTURES USING NEW MATERIALS, ELEMENTS EQUIPMENT, OR FIXTURES THAT SERVE THE SAME PURPOSE.

602.2 APPLICATION: LEVEL 1 ALTERATIONS SHALL COMPLY WITH THE PROVISIONS OF CHAPTER 7.

EBCNYS CHAPTER 7 - ALTERATIONS - LEVEL 1

SECTION 701 - GENERAL
701.1 SCOPE: LEVEL 1 ALTERATIONS AS DESCRIBED IN SECTION 602 SHALL COMPLY WITH THE REQUIREMENTS OF THIS CHAPTER. LEVEL 1 ALTERATIONS TO HISTORIC BUILDINGS SHALL COMPLY WITH THIS CHAPTER, EXCEPT AS MODIFIED IN CHAPTER 12.

ALTERATION WORK AT THIS BUILDING CONSISTS OF THE FOLLOWING:

INTERIOR
1. VARIOUS HVAC UPGRADES
2. FIRE ALARM UPGRADES
3. VARIOUS BATHROOM UPGRADES
4. FLOORING AND CEILING REPLACEMENTS
5. REPLACING / ADDING CLOSERS TO DOORS WHERE NEEDED

EXTERIOR
1. BUILDING WEATHERIZATION UPGRADES
2. OUTDOOR LEARNING SPACE UPGRADES
3. REPAIRING BASEMENT RETAINING WALL
4. WINDOW REPLACEMENTS
5. TEACHERS ENTRANCE RAILING

2025 EBCNYS CHAPTER 7 ALTERATIONS - LEVEL 1

CODE SECTION	REQUIRED/ALLOWED	ACTUAL AND PROPOSED
SECTION 701.1 CONFORMANCE	AN EXISTING BUILDING OR PORTION THEREOF SHALL NOT BE ALTERED SUCH THAT THE BUILDING BECOMES LESS SAFE THAN ITS EXISTING CONDITION.	COMPLIES.
SECTION 702.1 INTERIOR FINISHES	NEWLY INSTALLED INTERIOR WALL AND CEILING FINISHES SHALL COMPLY WITH CHAPTER 8 OF THE BUILDING CODE OF NEW YORK STATE.	COMPLIES.
SECTION 703 FIRE PROTECTION	ALTERATIONS SHALL BE DONE IN A MANNER THAT MAINTAINS THE LEVEL OF FIRE PROTECTION PROVIDED.	NEW WORK SHALL COMPLY WITH THE BUILDING CODE OF NEW YORK STATE
SECTION 704 MEANS OF EGRESS	ALTERATIONS SHALL BE DONE IN A MANNER THAT MAINTAINS THE LEVEL OF PROTECTION PROVIDED FOR THE MEANS OF EGRESS.	NEW WORK SHALL COMPLY WITH THE BUILDING CODE OF NEW YORK STATE
SECTION 706 STRUCTURAL	WHERE ALTERATION WORK INCLUDES REPLACEMENT OF EQUIPMENT THAT IS SUPPORTED BY THE BUILDING OR WHERE A REROOFING PERMIT IS REQUIRED, THE PROVISIONS OF THIS SECTION SHALL APPLY.	COMPLIES.
SECTION 707 ENERGY CONSERVATION	LEVEL 1 ALTERATIONS TO EXISTING BUILDINGS OR STRUCTURES DO NOT REQUIRE THE ENTIRE BUILDING OR STRUCTURE TO COMPLY WITH THE ENERGY REQUIREMENTS OF THE ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE OR RESIDENTIAL CODE OF NEW YORK STATE. THE ALTERATIONS SHALL CONFORM TO THE ENERGY REQUIREMENTS OF THE ENERGY CONSERVATION CONSTRUCTION CODE OF NEW YORK STATE OR RESIDENTIAL CODE OF NEW YORK STATE AS THEY RELATE TO NEW CONSTRUCTION ONLY.	COMPLIES.

LEGEND

FE / FEC	EXISTING FIRE EXTINGUISHER
F	EXISTING PULL STATION
ST	EXISTING FIRE ALARM STROBE
H	EXISTING HORN / STROBE COMBO
H	EXISTING FIRE ALARM HORN
B	EXISTING FIRE ALARM BELL
AED	EXISTING AUTOMATED EXTERNAL DEFIBRILLATOR
SD	EXISTING SMOKE DETECTOR
	EXISTING EXIT SIGN
EL	EXISTING EMERGENCY LIGHTING
EX / EL	EXISTING EXIT SIGN AND EMERGENCY LIGHTING
R	INDICATES EXISTING RESCUE WINDOW LOCATIONS

GENERAL CODE NOTES (ALTERATION LEVEL 1) (EXISTING BUILDING CODE OF NYS)

1. "THE REMOVAL AND REPLACEMENT OR THE COVERING OF EXISTING MATERIALS, ELEMENTS, EQUIPMENT, OR FIXTURES USING NEW MATERIALS, ELEMENTS, EQUIPMENT, OR FIXTURES THAT SERVE THE SAME PURPOSE", IS CLASSIFIED AS AN ALTERATION LEVEL 1 PER EBCNYS SECTION 602.1.
2. EXISTING EGRESS SHALL BE MAINTAINED. EXISTING EXIT SIGNS TO REMAIN (TYP. FOR ALL)
3. EXISTING SMOKE DETECTORS TO REMAIN (TYP. FOR ALL).
4. EXISTING FIRE EXTINGUISHERS TO REMAIN (TYP. FOR ALL).
5. ALL INTERIOR WALL AND CEILING FINISHES MUST MEET OR EXCEED THE REQUIREMENTS STATED IN TABLE 803.13.
6. ALL GLAZING IN DOORS, FIXED SIDE PANELS ADJOINING DOORS, INTERIOR PARTITIONS WHERE GLAZING EXTENDS TO WITHIN 1'-6" OF FINISHED FLOOR AND GLASS PANELS GREATER THAN 50 SQ. FT. TO BE FULLY TEMPERED SAFETY GLASS PER NYSBC 2406.1.
7. INTERIOR GLAZING SIZES AND TYPES SHALL COMPLY WITH FIRE RATING (UL 263, ASTM E119) PER NYSBC 703.6.

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CONSULTANTS:

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
L. RAUSCHER	L. RAUSCHER	S.MANDIC	-

PROJECT No:	DATE:	SCALE:
SMSD2505	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT
ALL CONTRACTS

STATUS
SED SUBMISSION

SHEET TITLE
CODE COMPLIANCE INFORMATION AND EXISTING BASEMENT PLAN (FOR INFORMATION ONLY)

DRAWING No.
SI-G 101.00

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7/21/2026 11:06:26 AM

EXISTING CONDITIONS NOTES:

1. EXISTING SURVEY PREPARED BY H2M ARCHITECTS + ENGINEERS. DATED NOVEMBER 2025.
2. MARKOUT OF UNDERGROUND UTILITIES COMPLETED BY X-RAY LOCATING SERVICES, INC.
3. BENCHMARK 1 - (SQUARE CUT SET IN LIGHT POST, SOUTH END OF PARKING LOT IMPROVEMENTS, EL. 260.15). BENCHMARK 2 - (NAIL SET IN UTILITY POLE, SOUTHWEST OF ENTRANCE FROM ROUTE 202, EL. = 266.95). BENCHMARK 3 - (SQUARE CUT SET IN LIGHT POST, NORTHEAST END OF PARKING LOT IMPROVEMENTS, EL. = 262.77).
4. LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES BOTH PUBLIC AND CUSTOMER OWNED, WERE OBTAINED FROM EITHER OLD MAPS, SURVEYS, DRAWINGS/RECORDS SUPPLIED BY OTHERS AND/OR UTILITY MARKOUT. THE OWNER AND ENGINEER DO NOT GUARANTEE OR ACCEPT RESPONSIBILITY FOR ANY DAMAGE TO SUCH FACILITIES DUE TO DISCREPANCIES IN LOCATION AND SIZE SHOWN ON THE PLANS OR THOSE UTILITIES AND STRUCTURES NOT SHOWN.

SITE DEMOLITION NOTES:

1. REPORT ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THE PLANS TO THE ENGINEER IN WRITING IMMEDIATELY.
2. UNDERGROUND UTILITY INFORMATION SHOWN ON THESE PLANS WAS OBTAINED FOR DESIGN PURPOSES ONLY. PROVIDE FOR CONSTRUCTION MARKOUT AND LOCATE EXISTING UNDERGROUND UTILITIES. NO EXCAVATION CAN COMMENCE UNTIL UTILITY DOCUMENTATION HAS BEEN COMPLETED.
3. AFTER MARKOUT AND PRIOR TO DISTURBING THE SITE, UNCOVER ALL SUBSURFACE UTILITIES AND STRUCTURES WITHIN LIMITS OF DISTURBANCE TO CONFIRM THEIR LOCATION AND DEPTH.
4. NO COMPENSATION WILL BE MADE FOR ANY INCONVENIENCE CAUSED BY ENCOUNTERING UTILITIES AND STRUCTURES WHICH ARE NOT SHOWN, OR ARE INACCURATELY SHOWN ON THE PLANS.
5. REPAIR ANY DAMAGE TO EXISTING UTILITIES RESULTING FROM CONTRACTOR OPERATIONS IMMEDIATELY AT NO COST TO OWNER.
6. REPAIR ANY DAMAGE TO EXISTING SITE FEATURES SCHEDULED TO REMAIN RESULTING FROM CONTRACTOR OPERATIONS AT NO COST TO OWNER.
7. SAWCUT CONCRETE PAVEMENT BACK TO NEAREST EXPANSION/CONTROL JOINT.
8. PROVIDE TEMPORARY FENCING TO PROTECT WORK AREAS.
9. INSTALL EROSION CONTROL MEASURES AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN PRIOR TO ANY GROUND DISTURBANCE.
10. DELINEATE THE LIMITS OF CLEARING AND REVIEW WITH THE OWNER PRIOR TO COMMENCING WORK.
11. NOTIFY OWNER AND ENGINEER IMMEDIATELY IN WRITING WHEN UNKNOWN STRUCTURES OR SUSPECTED HAZARDOUS OR CONTAMINATED MATERIALS ARE ENCOUNTERED PRIOR TO REMOVAL OR DISTURBANCE.
12. TAKE APPROPRIATE MEASURES TO PROTECT PEDESTRIANS AND VEHICULAR TRAFFIC DURING REMOVAL ACTIVITIES, AND PROVIDE TEMPORARY MEASURES FOR THE PROTECTION AND SAFETY OF THE PUBLIC UNTIL FINAL ACCEPTANCE BY THE OWNER.
13. BACKFILL ALL VOIDS RESULTING FROM THE REMOVAL OF EXISTING SITE FEATURES. BACKFILL TO BE SOIL, FREE OF ORGANIC MATERIAL, DEBRIS, TRASH, CLAY AND STONES LARGER THAN 4 INCHES.

SITE PLAN NOTES:

1. INSPECT THE SITE PRIOR TO SUBMISSION OF BIDS AND MAKE NO ADDITIONAL CLAIMS REGARDING SITE CONDITIONS THEREAFTER.
2. ARCHITECTURAL AND STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE CIVIL DRAWINGS FOR THE LAYOUT AND CONSTRUCTION OF THE BUILDING FOUNDATIONS AND/OR OTHER BUILDING ELEMENTS. REPORT ANY DISCREPANCIES BETWEEN CIVIL, ARCHITECTURE AND STRUCTURAL DRAWINGS IN WRITING TO THE CIVIL ENGINEER PRIOR TO CONSTRUCTION BUILDING FOUNDATIONS AND/OR OTHER BUILDING ELEMENTS.
3. NOTIFY THE OWNER AND H2M (TELEPHONE 914-358-5623) AT LEAST 48 HOURS PRIOR TO THE COMMENCEMENT OF THE WORK. THE SAME NOTICE SHALL BE REQUIRED WHEN RESUMING WORK AFTER ANY STOPPAGE OR DELAY.
4. COMPLETE ALL SURVEY AND STAKEOUT AS REQUIRED TO PROPERLY COMPLETE THE WORK.
5. PERFORM DAILY CLEANUP OPERATIONS INCLUDING REMOVAL OF DEBRIS AND EXCESS CONSTRUCTION MATERIAL, AND DRIVEWAY/STREET CLEANING TO THE SATISFACTION OF THE OWNER.
6. DURING ALL NON-WORKING HOURS, STORE ALL EQUIPMENT AND MATERIALS WITHIN AN AREA DESIGNATED BY THE OWNER AT THE PROJECT SITE.
7. ALL CURB DIMENSIONS SHOWN REFER TO THE FACE OF CURB.
8. ALL CONSTRUCTION TO CONFORM WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODE REQUIREMENTS.
9. COORDINATE CONSTRUCTION ACTIVITIES WITH OWNER TO MINIMIZE INTERRUPTION TO THE OWNER'S OPERATIONS.
10. RESTORE SURROUNDING AREAS DAMAGED OR DISTURBED DURING CONSTRUCTION. RESTORE TO NEW CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.
11. RESTORE ALL DISTURBED GRASS AREAS AND ALL AREAS NOT SPECIFICALLY IDENTIFIED FOR OTHER IMPROVEMENTS WITH 4 INCHES OF TOPSOIL AND SEED.
12. REMOVE ALL ASPHALT FROM EXISTING CASTINGS.
13. SEAL ALL JOINTS BETWEEN NEW ASPHALT AND EXISTING ASPHALT WITH HOT ASPHALT CEMENT.

GRADING AND DRAINAGE NOTES:

1. FOR NEW CONSTRUCTION THAT MEETS EXISTING CONDITIONS, ABUTTING SURFACES SHALL BE FLUSH AND ALIGNED.
2. THE CONTRACTOR SHALL CONFIRM INVERT ELEVATIONS OF ALL ROOF DRAINS AND SANITARY HOUSE CONNECTIONS PRIOR TO COMMENCING SITE DRAINAGE CONSTRUCTION.
3. ADJUST ALL EXISTING CASTINGS AND VALVE COVERS TO MEET PROPOSED GRADE.
4. CONSTRUCTION DEBRIS AND EXCESS SOIL SHALL BE REMOVED AND LEGALLY DISPOSED OFF SITE.
5. UNSUITABLE SOILS ENCOUNTERED DURING CONSTRUCTION SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER IMMEDIATELY IN WRITING BEFORE REMOVAL OR DISTURBANCE.

TEMPORARY SEEDING NOTES:

1. APPLICABLE TO ANY DISTURBED AREAS OF THE SITE WHICH REMAIN DISTRUBED FOR MORE THAN ONE (1) WEEK.
2. ROUGH GRADE AREA PRIOR TO SEEDING. REMOVE LARGE DEBRIS AND ROCKS.
3. TEMPORARY SEEDING SHALL BE AS FOLLOWS:
   - 3.1. SPRING TO EARLY FALL: SEED AREA WITH RYEGRASS (ANNUAL OR PERENNIAL) AT 30 LBS. PER ACRE (OR USE 1 LB./1000 SQ. FT.).
   - 3.2. LATE FALL TO EARLY WINTER: SEED AREA WITH CERTIFIED 'AROOSTOOK' WINTER RYE (CEREAL RYE) AT 100 LBS. PER ACRE (2.5 LBS./1000 SQ. FT.).
4. MULCH AREA WITH HAY OR STRAW AT 2 TONS/ACRE (APPROX. 90 LBS./1000 SQ. FT. OR 2 BALES).
5. FOR FURTHER DETAIL, REFER TO PAGE 4.58 OF THE NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL.

EROSION CONTROL NOTES:

1. DURING THE COURSE OF CONSTRUCTION, EROSION AND SEDIMENT CONTROL MEASURES ARE NECESSARY TO PREVENT THE TRANSPORT OF SEDIMENT TO UNDISTURBED AREAS, PONDS, WATER COURSES, DRAINAGE SYSTEMS, RECHARGE BASINS, AND ROADS. THE MINIMUM EROSION CONTROL MEASURES REQUIRED ARE INDICATED ON THIS PLAN. IN ADDITION, THE FOLLOWING GENERAL CONDITIONS SHALL BE OBSERVED:
   - a. EXISTING VEGETATION SCHEDULED TO REMAIN SHALL BE PROTECTED AND REMAIN UNDISTURBED.
   - b. INSTALL ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES AS REQUIRED TO PREVENT THE INCIDENTAL DISCHARGE OF SEDIMENT FROM THE SITE.
2. SPECIFIC METHODS AND MATERIALS EMPLOYED IN THE INSTALLATION AND MAINTENANCE OF EROSION CONTROL MEASURES MUST CONFORM TO THE LATEST EDITION OF THE "NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL".
3. INSTALL PROPRIETARY EROSION AND SEDIMENT CONTROL PRODUCTS IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
4. ADJUST EROSION AND SEDIMENT CONTROL MEASURES TO ACCOMMODATE CONSTRUCTION PHASING TO MAINTAIN EFFECTIVENESS OF EROSION AND SEDIMENT CONTROL MEASURES.
5. PROTECT EXISTING DRAINAGE INLETS WITHIN THE PROJECT LIMITS AND NEW DRAINAGE INLETS INSTALLED AS PART OF THIS PROJECT FROM SEDIMENT INTRUSION.
6. PERFORM INSPECTION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES ON A TWICE WEEKLY BASIS AND AFTER HEAVY OR PROLONGED STORMS. MAINTENANCE MEASURES INCLUDE, BUT ARE NOT LIMITED TO, CLEANING AND REPAIR OF ALL EROSION AND SEDIMENT CONTROL MEASURES.
7. UTILIZE APPROPRIATE MEANS TO CONTROL DUST DURING CONSTRUCTION, INCLUDING BUT NOT LIMITED TO APPLYING WATER TO BARE SOIL SURFACES.
8. MAINTAIN THE STABILIZED CONSTRUCTION ENTRANCE TO PREVENT SOIL AND LOOSE DEBRIS FROM BEING TRACKED ONTO LOCAL ROADS. MAINTAIN THE CONSTRUCTION ENTRANCE WEEKLY UNTIL THE SITE IS PERMANENTLY STABILIZED.
9. ALL CONCRETE WASHOUT MUST BE CONDUCTED OFFSITE AND IN ACCORDANCE WITH PAGE 2.23 OF THE NYSDEC E&SC DESIGN MANUAL.
10. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL DISTURBED AREAS ARE PERMANENTLY STABILIZED. AFTER PERMANENT STABILIZATION, REMOVE ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES AND ALL ACCUMULATED SEDIMENT AND DEBRIS FROM THE SITE AND DRAINAGE STRUCTURES.

TOTAL LAND DISTURBANCE = 0.98 ACRES

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) NOTES:

1. PURSUANT TO THE REQUIREMENTS OF SPDES GENERAL PERMIT FOR CONSTRUCTION ACTIVITY GP-0-25-001 ESTABLISHED BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, A STORMWATER POLLUTION PREVENTION PLAN (SWPPP) HAS BEEN PREPARED FOR THIS PROJECT. ADHERE TO AND IMPLEMENT ALL REQUIREMENTS OF THE SWPPP AND EROSION AND SEDIMENT CONTROL PLAN.
2. REVIEW THE SWPPP AND SIGN IN THE LOCATION SHOWN STATING THAT ALL WORK PERTAINING TO EROSION AND SEDIMENT CONTROL WILL BE PERFORMED WITHIN REQUIREMENTS OF THE SWPPP AND EROSION AND SEDIMENT CONTROL PLAN.
3. THE OWNER SHALL PROVIDE A QUALIFIED INSPECTOR WHO WILL PERFORM TWICE WEEKLY INSPECTIONS AT THE CONSTRUCTION SITE. THE QUALIFIED INSPECTOR SHALL MEET THE REQUIREMENTS OUTLINED IN SPDES GENERAL PERMIT FOR STORMWATER DISCHARGE FROM CONSTRUCTION ACTIVITY (GP-0-25-001). IF THE INSPECTIONS FIND ANY DEVIATIONS FROM THE SWPPP OR THE EROSION AND SEDIMENT CONTROL PLAN IT WILL BE NOTED. THE CONTRACTOR WILL HAVE 7 DAYS TO CORRECT ANY DEVIATIONS SO THAT IT COMPLIES WITH THE REQUIREMENTS OF THE SWPPP AND OR EROSION AND SEDIMENT CONTROL PLAN. 2 WEEKLY INSPECTIONS WILL BE PERFORMED.

SITE SOILS NOTE:

1. SOILS OBSERVED DURING GEOTECHNICAL ANALYSIS DETERMINED PRESENCE OF ASH AND METAL WITHIN THE FILL MATERIALS. ANY EXCAVATED MATERIALS MUST BE EITHER REUSED IN THE SAME LOCATION OR DIRECTLY LOADED INTO TRUCKS AND TRANSPORTED OFFSITE. SHOULD ANY FILL MATERIALS REMAIN ONSITE OVERNIGHT, SOIL SHALL BE COVERED WITH PLASTIC TO PREVENT SEDIMENT/POLLUTANT RUNOFF.

PERMANENT SEEDING AND SOIL RESTORATION NOTES:

1. APPLICABLE TO ALL DISTURBED AREAS OF THE SITE NOT SPECIFIED FOR OTHER IMPROVEMENTS.
2. SOIL RESTORATION SHALL BE IN ACCORDANCE WITH CHAPTER 5, TABLE 5.3 OF THE NYS STORMWATER MANAGEMENT DESIGN MANUAL.
3. SOIL RESTORATION SHALL BE REQUIRED ON ALL AREAS OF THE SITE WHICH TOPSOIL WAS STRIPPED AND IN NEW PERVIOUS AREAS PREVIOUSLY IMPERVIOUS OR IN AREAS WITH HEAVY COMPACTION DUE TO CONSTRUCTION OPERATIONS.
4. SOIL RESTORATION STEPS ARE AS FOLLOWS:
   - 4.1. APPLY 3 INCHES OF COMPOST OVER SUBSOIL
   - 4.2. TILL COMPOST INTO SUBSOIL TO A DEPTH OF AT LEAST 12 INCHES USING A CAT-MOUNTED RIPPER, TRACTOR-MOUNTED DISC, OR TILLER, MIXING, AND CIRCULATING AIR AND COMPOST INTO SUBSOILS
   - 4.3. ROCK-PICK UNTIL UPLIFTED STONE/ROCK MATERIALS OF FOUR INCHES AND LARGER SIZE ARE CLEANED OFF THE SITE
   - 4.4. APPLY TOPSOIL TO A DEPTH OF 6 INCHES, COMPACT TO A UNIFORM THICKNESS OF 4" AND FINELY GRADE AND LOOSEN WITH MECHANICAL RAKES TO ENSURE SEED ACCEPTANCE
   - 4.5. SEED AND FERTILIZE AS REQUIRED BY NOTE #5 BELOW
5. SEEDING, MULCHING AND FERTILIZING SHALL BE AS FOLLOWS:
   - 5.1. FERTILIZER SHALL BE APPLIED AT 6 LBS OF FS O-F-241 FERTILIZER/1,000 SQ. FT.
   - 5.2. PERMANENT HYDROSEEDING SHALL BE IN ACCORDANCE WITH SPECIFICATION NO 329219.16. SEED MIX SHALL BE ONE OF THE TWO BELOW MIXES:

MIX A:

GRASS TYPE	% OF MIXTURE	MIN. % GERMINATION
KENTUCKY 31 FESCUE	50	90
N.K. 100 PERENNIAL RYE GRASS	25	85
PENN LAWN FESCUE	25	90

MIX B:

GRASS TYPE	% OF MIXTURE	MIN. % GERMINATION
MERION BLUEGRASS	50	80
PENN LAWN FESCUE	30	90
N.K. 106 HYBRID RYE GRASS	20	85

6. MAINTENANCE AND INSPECTION:
   - 6.1. UPON COMPLETION OF SOIL RESTORATION, AREA SHOULD BE KEPT FREE OF ANY VEHICULAR/FOOT TRAFFIC OR WEIGHTED LOADS.
   - 6.2. INSPECT GRASS AREAS DAILY TO AND WATER WHEN NECESSARY (WEATHER DEPENDANT) TO PREVENT GRASS/SOIL FROM BECOMING DRY.
   - 6.3. MOW GRASS AT REGULAR INTERVALS TO MAINTAIN AT A MAXIMUM HEIGHT OF 2-1/2 INCHES. DO NOT CUT MORE THAN 1/3 OF GRASS BLADE AT ANY ONE MOWING. NEATLY TRIM EDGES AND HAND CLIP WHERE NECESSARY. IMMEDIATELY REMOVE CLIPPINGS AFTER MOWING AND TRIMMING.
   - 6.4. MAINTAIN SEEDED AREAS IMMEDIATELY AFTER PLACEMENT UNTIL GRASS IS WELL ESTABLISHED AND EXHIBITS A VIGOROUS GROWING CONDITION (80% MIN. COVERAGE), AS DETERMINED BY AT LEAST TWO CUTTINGS, OR UNTIL THE JOB IS ACCEPTED BY THE OWNER, WHICHEVER OCCURS LAST.
   - 6.5. IF WITHIN 14-30 DAYS FOLLOWING SEEDING OF THE RESTORED AREAS GRASS HAS NOT ACHIEVED A MIN. 80% GERMINATION/COVERAGE, BARE AREAS SHALL BE RESEEDED. AREAS SHALL BE CONTINUOUSLY MAINTAINED AND RESEEDED UNTIL THE MINIMUM COVERAGE NEEDS ARE MET.

EXISTING CONDITIONS AND DEMOLTION LEGEND

DESCRIPTION	SYMBOL
BENCHMARK	
DRAINAGE MANHOLE	D
CATCH BASIN	
INLET	
INLET	
ROOF DRAIN/LEADER	
SANITARY MANHOLE	S
ELECTRIC RISER	ER
LIGHT	
UTILITY POLE/GUY POLE	
GUY WIRE	C
PULL BOX	
CABLE TELEVISION BOX	
SIGN	
TWO POST SIGN	
FLAG POLE	FP
EVERGREEN TREE	
CURB	
DROP CURB	
STORM DRAIN	D — D
OVERHEAD WIRES	OH — OH
FENCE	X — X
METAL HNADRAIL	
EDGE OF PAVEMENT	
CONTOUR	100
SPOT ELEVATION	100.0
TOP/BOT CURB GRADE	tc 100.50 bc 100.00
HANDICAP PARKING STALL	
ASPHALT PAVEMENT	
CONCRETE PAVEMENT	
BRICK/PAVER PAVEMENT	
WOOD CHIPS	
REMOVE AND DISPOSE OF EXISTING CURB	
SAWCUT PAVEMENT LINE	
REMOVE AND DISPOSE EXISTING ASPHALT PAVEMENT AND BASE	
REMOVE AND DISPOSE EXISTING CONCRETE SIDEWALK	
REMOVE AND DISPOSE OF EXISTING CATCH BASIN FRAME AND GRATE	

SITE IMPROVEMENTS LEGEND

DESCRIPTION	SYMBOL
CURB	
CONCRETE DROP CURB	
ASPHALT PAVEMENT (HEAVY DUTY)	
ASPHALT PAVEMENT (WALKWAY)	
ASPHALT PAVEMENT (NYSDOT ROW)	
ASPHALT PAVEMENT (GUTTER)	
CONCRETE PAVEMENT SIDEWALK	
METAL HANDRAIL	
HANDICAP RAMP	
PARKING STALL COUNT	12
SPOT ELEVATION	+121.50
TOP AND BOTTOM CURB ELEVATION	TC140.00 BC139.50
MAJOR CONTOUR	240
MINOR CONTOUR	241
NEW CATCH BASIN FRAME AND GRATE	
NEW SILT FENCE	SF — SF
LIMIT OF CLEARING, GRADING, AND GROUND DISTURBANCE	
NEW INLET SEDIMENT BAG PROTECTION	
NEW CURB INLET SEDIMENT BAG	
NEW STABILIZED CONSTRUCTION ENTRANCE	

TEMPORARY CONSTRUCTION FENCING LEGEND

x	C CONTRACTOR TO PROVIDE 8'-0" HIGH TEMPORARY CHAIN LINK FENCING AND GATE AS SHOWN ON DRAWINGS (EXACT LOCATION OF FENCING TO BE VERIFIED WITH OWNER AND CONSTRUCTION MANAGER). THIS FENCING SHALL BE CONSTRUCTED OF NINE GAUGE GALV. STEEL WIRE W/ 2½" GALV. LINE POST & 3" END/CORNER POST, WITH TOP RAIL & BOTTOM WIRE. PROVIDE TRAFFIC & PEDESTRIAN GATED WITH HARDWARE & LOCKS. ALL FENCING SHALL HAVE A CLOTHLY WOVEN, BLIND SCREEN MESH INSTALLED ON THE "PUBLIC" SIDE OF THE FENCE. MESH TO BE DARK GREEN OR BLACK. WHEN DIRECTED BY THE CONSTRUCTION MANAGER, THE SAME CONTRACTOR SHALL REMOVE & DISPOSE OF THIS FENCING AND ALL RELATED MATERIALS.
	C CONTRACTOR TO PROVIDE 20'-0" WIDE TRAFFIC GATE W/ 4" GALV. POST AS SHOWN ON DRAWINGS
x	C CONTRACTOR TO PROVIDE 3'-0" WIDE PEDESTRIAN GATE

CONSTRUCTION SEQUENCING NOTES:

THE FOLLOWING IS A GENERAL SEQUENCE OF CONSTRUCTION ACTIVITIES FOR THE PHASE 1 WORK:

1. CONDUCT A PRE-CONSTRUCTION MEETING AT LEAST 48-HOURS PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES. ATTENDEES TO INCLUDE OWNER, ARCHITECT/ENGINEER, CONTRACTOR AND DEP.
2. INSTALLATION OF CONSTRUCTION FENCING ALONG LIMITS OF DISTURBANCE. INSTALLATION OF SILT FENCING, INLET PROTECTION ON EXISTING STRUCTURES, STABILIZED CONSTRUCTION ENTRANCE AND ALL OTHER PRACTICES/MEASURES AS SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN;
3. ROUGH GRADING OF THE SITE (I.E. PLAYGROUND AREA AND RAIN GARDEN AREA), THE EXISTING SOILS IN AREAS OF ASPHALT REMEDIATION ARE TO REMAIN UNDISTURBED; FOLLOWING ROUGH GRADING OF SITE ALL EXPOSED AREAS WHERE WORK WILL NOT BE PERFORMED SHOULD BE TEMPORARILY OR PERMANENTLY STABILIZED. STABILIZATION WORK MUST BE INITIATED BY THE END OF THE NEXT DAY AND COMPLETED WITHIN SEVEN (7) DAYS.
4. INSTALLATION OF THE NEW JELLYFISH TREATMENT DEVICE, RAIN GARDEN, STORMWATER INFRASTRUCTURE, DRAINAGE FRAMES & GRATES, FIELD INLETS, AND THE ASSOCIATED DRAINAGE PIPING. IMMEDIATELY INSTALL INLET PROTECTION ON ALL NEW CATCH BASINS AND FIELD INLETS WITH GRATES.
5. REPAVING OF PARKING LOT AND CONSTRUCTION OF SITE FEATURES INCLUDING NEW PLAYGROUND EQUIPMENT FOOTINGS AND SUPPORT POSTS.
6. FINAL GRADING OF DISTURBED AREAS TO FINISHED GRADE.
7. INSTALLATION OF NEW AGGREGATE BASE COURSE IN AREAS OF NEW PAVEMENT. INSTALLATION OF NEW CURBING, SIDEWALK, PLAYGROUND SURFACING AND CONCRETE PADS. INSTALLATION OF REMAINING PLAYGROUND FEATURES.
8. SEEDING OF DISTURBED AREAS AND OTHER FINAL LANDSCAPING MEASURES.
9. FOLLOWING FINAL STABILIZATION OF DISTURBED AREAS, REMOVAL OF REMAINING TEMPORARY EROSION AND SEDIMENT CONTROLS.
10. SILT REMOVAL AND CLEANING OF INLETS PROTECTED DURING CONSTRUCTION.

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White Plains, NY 10605
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NY Engineering Certificate of Authorization No. 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · SEAN PATRICK CALLAHAN · 092068-1 · LICENSED PROFESSIONAL ENGINEER

SEAN P. CALLAHAN, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 092068
08/31/2027 EXP. DATE
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S. PETERS	A. SODERMAN	B. LEDGER	S. CALLAHAN

PROJECT No.:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202,
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

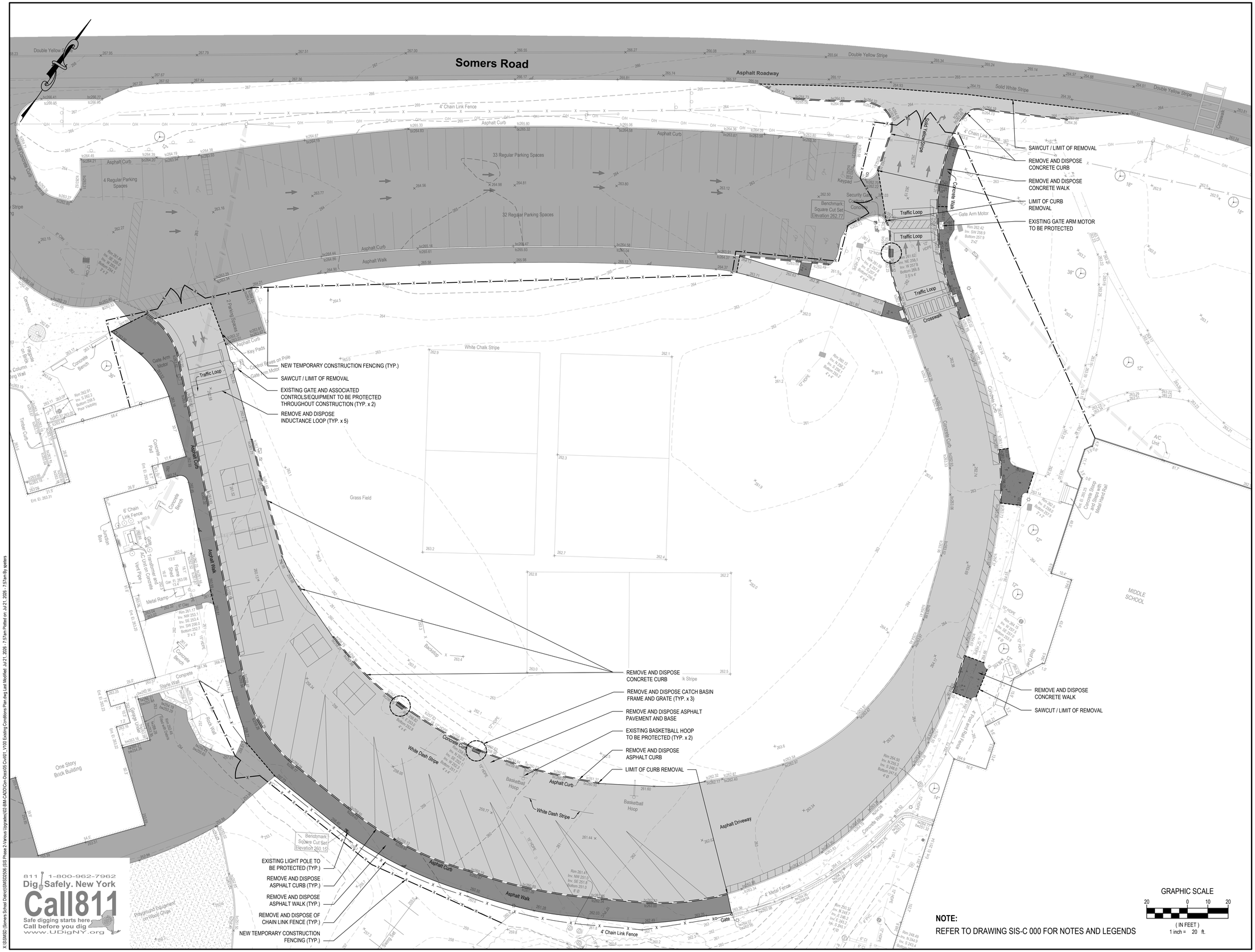
CONTRACT
CONTRACT C
CIVIL / SITE CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
GENERAL NOTES & LEGEND

DRAWING No.
SI-C 000.00

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GRAPHIC SCALE
20 0 10 20
(IN FEET)
1 inch = 20 ft.

X:\SIS\MSD Somers School District\SMSD2506 (SIS Phase 2 Various Upgrades)\02.BIM-CAD\Con-Docs\05 Civil\01_V1\0 Existing Conditions Plan.dwg Last Modified: Jul 21, 2026 - 7:57am Plotted on: Jul 21, 2026 - 7:57am By xyeters

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CONTRACT

CONTRACT C
CIVIL / SITE CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

EXISTING CONDITIONS & DEMOLITION PLAN

DRAWING No.

SI-CD 100.00

Somers Road

- 8 C500 NEW ASPHALT PAVEMENT (TYP. NYSDOT ROW)
- 9 C500 NEW CONCRETE CURB (TYP. NYSDOT ROW)
- 1 C501 NEW CONCRETE CURB (TYP.)
- LIMIT OF NEW CURB (TYP.)
- LIMIT OF NEW PAVEMENT (TYP.)
- APPROXIMATE LIMIT OF NYSDOT ROW
- NEW STOP BAR (TYP.) 3 C500
- NEW ASPHALT PAVEMENT KEY AT ALL TRANSITIONS TO EXISTING PAVEMENT (TYP.) 6 C500
- LIMIT OF NEW WALK (TYP.)
- NEW CONCRETE WALK (TYP.) 10 C500
- NEW DIRECTIONAL ARROW PAVEMENT MARKINGS (TYP.) 4 C500
- NEW YELLOW STRIPING (TYP.)
- NEW CROSSWALK PAVEMENT MARKINGS 3 C500
- 9 C501 NEW INDUCTANCE LOOPS FOR GATE (TYP. x 5) TO BE REPLACED IN KIND
- 7 C501 NEW CATCH BASIN FRAME AND GRATE RIM = 261.62
- 7 C500 NEW ASPHALT PAVEMENT WALK
- 4 C502 NEW CONCRETE ACCESSIBLE RAMP
- 5 C500 NEW ASPHALT PAVEMENT RECLAMATION
- NEW CONCRETE ACCESSIBLE RAMP 4 C502
- NEW CONCRETE ACCESSIBLE RAMP (TYPE 2) 11 C500
- NEW INDUCTANCE LOOPS FOR GATE (TYP. x 5) TO BE REPLACED IN KIND 9 C501
- NEW TEMPORARY STABILIZED CONSTRUCTION ENTRANCE 5 C501
- LIMIT OF CLEARING, GRADING AND GROUND DISTURBANCE
- NEW YELLOW STRIPING (TYP.) 1 C502
- NEW ASPHALT CURB (TYP.) 8 C501
- NEW ASPHALT DROP CURB 8 C501
- NEW CATCH BASIN FRAME AND GRATE RIM = 257.35 6 C501
- NEW 16' WIDE VINYL COATED CHAIN LINK FENCE DOUBLE SWING GATE 1 C502
- NEW CATCH BASIN FRAME AND GRATE RIM = 259.05 6 C501
- NEW MANUFACTURED TREATMENT DEVICE RIM = 259.80 INV (NW) 15"Ø HDPE = ±251.89 INV (SE) 15"Ø HDPE = ±251.89 2,3 C502
- NEW 18' WIDE ASPHALT SWALE 2 C501
- NEW WHITE PARKING STALL PAVEMENT MARKINGS (TYP.) 1 C500
- NEW RED BUS PARKING STALL PAVEMENT MARKINGS (TYP.) 2 C500
- NEW ASPHALT PAVEMENT WALK 7 C500
- NEW SILT FENCE (TYP) 3 C501
- NEW WHITE PARKING STALL PAVEMENT MARKINGS (TYP.) 7 C500
- NEW 4' HIGH VINYL COATED CHAIN LINK FENCE (TYP.) 10 C501
- NEW 8' WIDE VINYL COATED CHAIN LINK FENCE SWING GATE 11 C501
- NEW INLET SEDIMENT BAG PROTECTION (TYP. x 8) 4 C501
- NEW CIRCULAR INLET SEDIMENT BAG PROTECTION 4 C501

NOTE:
REFER TO DRAWING SIS-C 000 FOR NOTES AND LEGENDS

GRAPHIC SCALE
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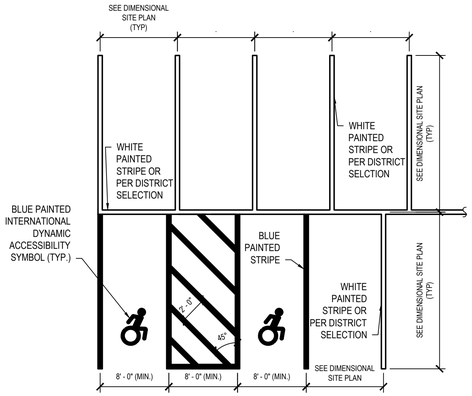
SED #: 66-21-01-06-0-006-021

CONTRACT
CONTRACT C
CIVIL / SITE CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
SITE IMPROVEMENTS PLAN

DRAWING No.
SI-CS 100.00

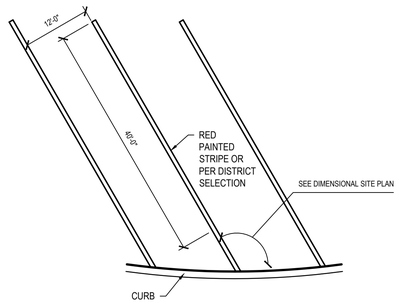


NOTES:

1. ALL STRIPING TO BE 4" WIDE.
2. SEE DIMENSIONAL SITE PLAN FOR LOCATIONS OF PARKING STALL SIGNAGE.

1 Parking Stall Layout - Single Striping

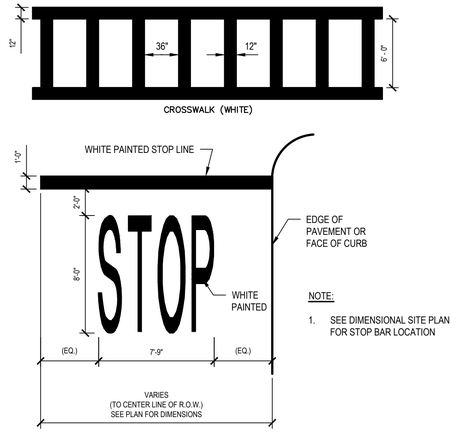
SCALE: NTS (321799.00 H2MX1) - U



NOTE:
ALL STRIPING TO BE 4" WIDE.

2 Parking Stall Layout - Bus Striping

SCALE: NTS

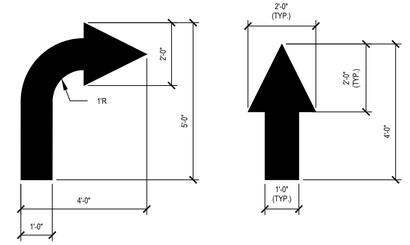


NOTE:

1. SEE DIMENSIONAL SITE PLAN FOR STOP BAR LOCATION

3 Stop Bar and Legend & Crosswalk Detail

SCALE: NTS 321723.13 (H2MX2) -U

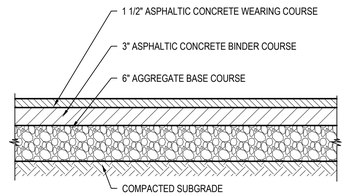


NOTES:

1. ALL ARROWS MAY NOT BE APPLICABLE TO THIS PROJECT. REFER TO SITE PLAN SHEETS.
2. TURN ARROW DETAILS SHOWN ARE FOR RIGHT TURN. REVERSE DETAILS AS REQUIRED FOR LEFT TURNS.

4 Directional Arrows - On SIte

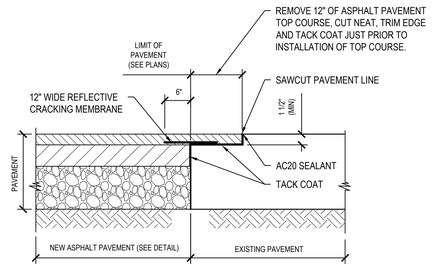
SCALE: NTS 321723.13 H2MX1 -U



NOTE:
COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557.

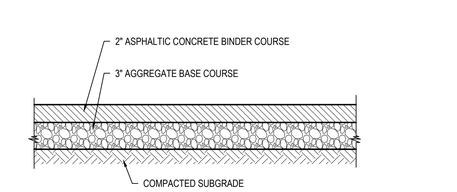
5 Asphalt Pavement - Heavy Duty

SCALE: NTS (321216.13 H2MX2) - U



New Asphalt Pavement Key to Existing Asphalt Pavement - Standard Duty

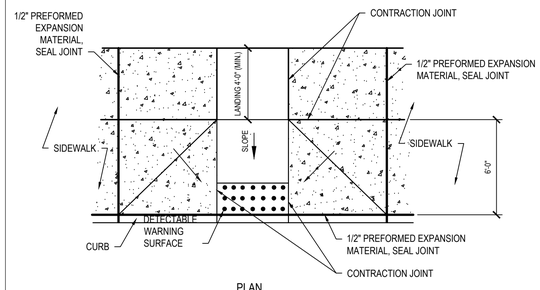
6 NTS



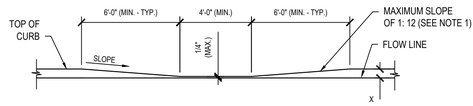
NOTE:
COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557.

7 Asphalt Pavement - Walkway

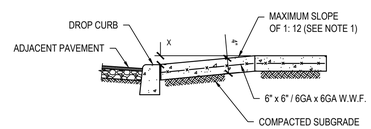
SCALE: NTS (321216.16 H2MX1) - U



PLAN



ELEVATION



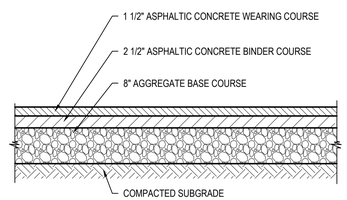
SECTION

NOTES:

1. DIMENSIONS SHOWN ARE APPLICABLE FOR INSTALLATION WITH 6" CURB REVEAL. DIMENSIONS OF FLARE AND RAMP LENGTH FOR INSTALLATION WITH ALTERNATE CURB REVEALS MAY BE MODIFIED TO MAINTAIN A RAMP SLOPE NOT TO EXCEED 1:12.
2. THE SIZE OF THE DETECTABLE WARNING FIELD SHALL BE 24" IN THE DIRECTION OF TRAVEL AND SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP EXCLUSIVE OF SIDE FLARES.
3. MAXIMUM SLOPE OF LANDING IS 2% IN ANY DIRECTION.
4. RAMP TRANSITIONS BETWEEN WALKS, GUTTERS OR STREETS SHALL BE FLUSH AND FREE OF ABRUPT VERTICAL CHANGES (1/4" MAX.)
5. CONCRETE TO ACHIEVE 4,000 P.S.I. STRENGTH AT 28 DAYS.
6. COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557.
7. APPLY BRUSH FINISH PERPENDICULAR TO DIRECTION OF SLOPE.
8. REFER TO CONCRETE SIDEWALK DETAIL FOR INFORMATION REGARDING CONTRACTION AND EXPANSION JOINTS.

11 Concrete Handicap Ramp - Mid Block - Flare

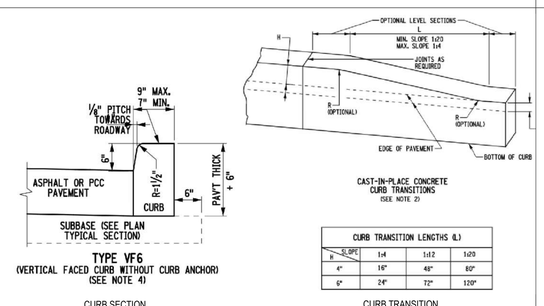
SCALE: NTS (321313.36 H2MX2) - U



NOTE:
COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557. ALL PAVEMENT MATERIALS TO COMPLY WITH NYSDOT STANDARDS.

8 Asphalt Pavement - NYSDOT ROW

SCALE: NTS (321216.13 H2MX1) - U



CURB SECTION

CAST-IN-PLACE CONCRETE CURB TRANSITIONS
(SEE NOTE 2)

CURB TRANSITION LENGTHS (L)			
SLOPE / H	1:4	1:12	1:20
4"	16"	48"	80"
6"	24"	72"	120"

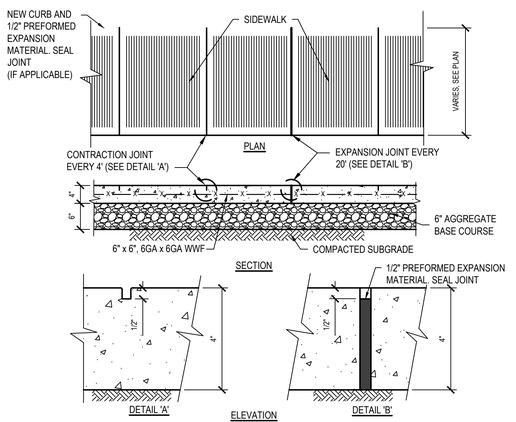
CURB TRANSITION

GENERAL NOTES:

1. WOOD FLOAT AND BRUSH FINISH ON ALL SURFACES ABOVE GRADE.
2. AT ALL CURB ENDINGS, PROVIDE SMOOTH TRANSITION DOWN TO PAVED SURFACE.
3. PROVIDE 1/2" PREFORMED EXPANSION MATERIAL AT 20' ON CENTER AND AT ALL CORNERS. SET EXPANSION MATERIAL 1/2" BELOW EXPOSED SURFACES AND SEAL JOINT.
4. CONCRETE TO ACHIEVE 4,000 PSI STRENGTH AT 28 DAYS.
5. MATERIALS INSTALLATION AND DESIGN STANDARDS TO COMPLY WOTH NYSDOT REQUIREMENTS, SEE NYSDOT STANDARD SHEET 609 FOR ADDITIONAL INFORMATION

9 NYSDOT Concrete Curb

SCALE: NTS



NOTES:

1. CONCRETE TO ACHIEVE 4000 PSI STRENGTH AT 28 DAYS
2. COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557.
3. APPLY BROOM FINISH PERPENDICULAR TO DIRECTION OF TRAVEL.

10 Concrete Sidewalk

SCALE: NTS 321313.33 H2MX1

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240 US-202,
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SED #: 66-21-01-06-0-006-021

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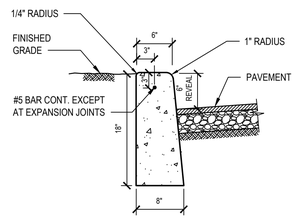
SHEET TITLE

SITE DETAILS

DRAWING No.

SI-C 500.00

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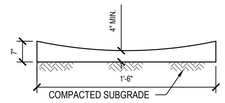


NOTES:

1. WOOD FLOAT AND BRUSH FINISH ON ALL SURFACES ABOVE GRADE.
2. AT ALL CURB ENDINGS, PROVIDE SMOOTH TRANSITION DOWN TO PAVED SURFACE.
3. PROVIDE 1/2" PREFORMED EXPANSION MATERIAL AT 20' ON CENTER AND AT ALL CORNERS. SET EXPANSION MATERIAL 1/2" BELOW EXPOSED SURFACES AND SEAL JOINT.
4. CONCRETE TO ACHIEVE 4,000 PSI STRENGTH AT 28 DAYS.

1 Concrete Curb

SCALE: NTS (321613.16 H2MX1)

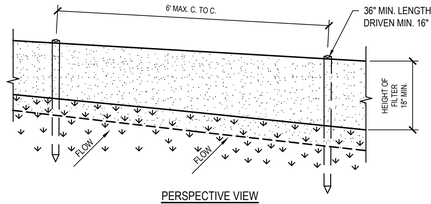


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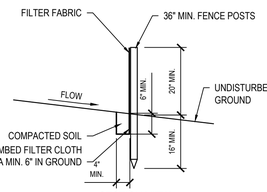
1. THE FLOW LINE OF THE ASPHALT GUTTER SHALL NOT VARY MORE THAN 0.01' VERTICALLY FROM A 10' STRAIGHT EDGE PLACED LONGITUDINALLY ALONG FLOW LINE.
2. THE FLOW LINE OF THE ASPHALT GUTTER SHALL NOT VARY MORE THAN 0.03' HORIZONTALLY FROM A 10' STRAIGHT EDGE PLACED LONGITUDINALLY ALONG FLOW LINE.

2 Asphalt Swale

SCALE: NTS



PERSPECTIVE VIEW



SECTION VIEW

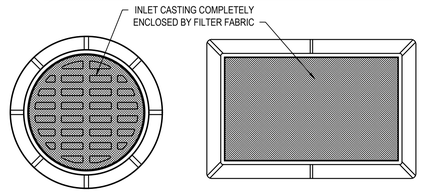
NOTES

1. POSTS SHALL BE 2" X 2" HARDWOOD OR APPROVED EQUIVALENT.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO POSTS AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED AND SECURE AT POST. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. INSPECT SILT FENCING TWICE WEEKLY. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND ACCUMULATED SEDIMENT REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
5. REMOVE SILT FENCE UPON PERMANENT STABILIZATION OF UPLAND AREAS.

3 Silt Fence - Standard

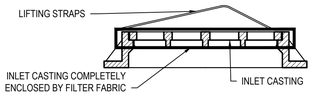
SCALE: NTS 312513.13 NYDC1-U

FILTER FABRIC PROPERTIES			
Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	lbs	365 x 200
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	lbs	90
Mullen Burst Strength	ASTM D 3786	psi	450
Trapezoid Tear Strength	ASTM D 4533	lbs	115 x 75
UV Resistence	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	US Std Sieve)	40
Flow Rate	ASTM D 4491	gal/min/ft²	145
Permittivity	ASTM D 4491	Sec⁻¹	2.1



PLAN VIEW- CIRCULAR INLET

PLAN VIEW- RECTANGULAR INLET

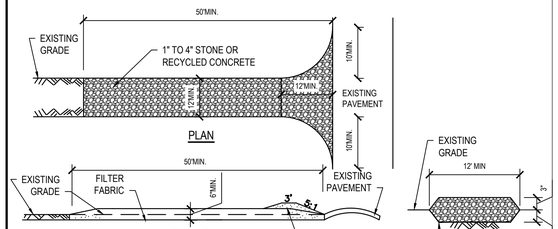


NOTES

1. INSPECT INLET PROTECTION AT A MINIMUM OF TWICE WEEKLY AND AFTER EACH RAIN EVENT. REMOVE ACCUMULATED SEDIMENT AND DEBRIS TO MAINTAIN ADEQUATE FLOW THROUGH FILTER FABRIC. REPLACE IF ANY TEARS IN MATERIAL ARE NOTED OR IF FLOW BECOMES IMPEDED FOLLOWING CLEANINGS.
2. REMOVE INLET PROTECTION UPON PERMANENT STABILIZATION OF CONSTRUCTION SITE.

4 Sediment Bag Inlet Protection

SCALE: NTS

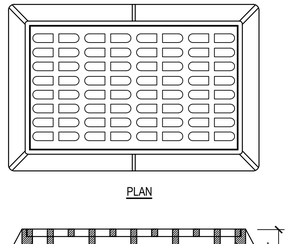


CONSTRUCTION SPECIFICATIONS

1. STONE OR RECYCLED CONCRETE SIZE TO BE 1" TO 4".
2. LENGTH - NOT LESS THAN 50 FEET (UNLESS INDICATED OTHERWISE ON PLANS).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. PLACE FILTER FABRIC OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE. FILTER FABRIC TO BE TREVIRA SPUNBOND, 1135 MIRAFI 600X OR EQUIVALENT.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY, ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY. IF TRACKING IS OBSERVED SEDIMENT LADEN STONE SHALL BE REMOVED AND REPLACED WITH CLEAN STONE TO MAINTAIN EFFECTIVENESS.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. INSPECTIONS SHALL BE PERFORMED TWICE WEEKLY AND AFTER EACH RAIN. ANY NEEDED MAINTENANCE SHALL BE PROVIDED.

5 Stabilized Construction Entrance

SCALE: NTS (312513.19 NYDC1) - U

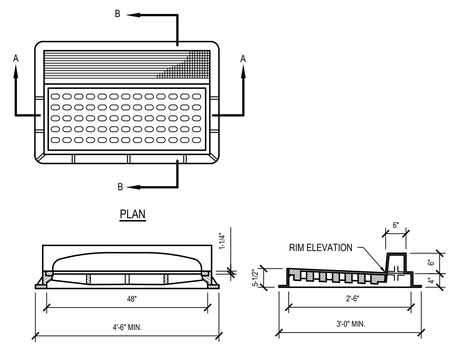


NOTES:

1. CASTING MUST BE CAST IRON AND CAPABLE OF SUPPORTING THE AASHTO HS-20 HIGHWAY LOADING.
2. GRATE PATTERN TO BE BICYCLE- SAFE.

6 Rectangular Frame & Grate - Heavy Duty

SCALE: NTS (334913.23 H2MZ1)

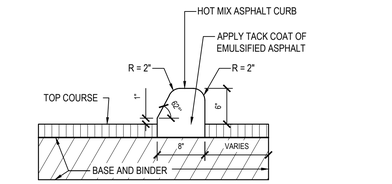


NOTE

1. CASTING MUST BE CAST IRON AND CAPABLE OF SUPPORTING AASHTO HS-20 HIGHWAY LOADING.
2. GRATE PATTERN TO BE BICYCLE SAFE.

7 Combination Inlet Frame & Grate - Heavy Duty

SCALE: NTS (334913.23 H2MX3)

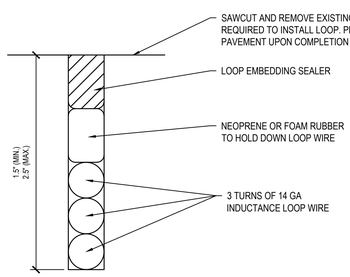


NOTES

1. POUR NEW CURB SECTIONS AFTER COMPLETION OF BASE AND BINDER COURSES BUT PRIOR TO INSTALLATION OF TOP COURSE.
2. POUR CURB SECTIONS TO ALLOW FOR 6" REVEAL UNLESS OTHERWISE NOTED ON PLANS.
3. IN AREAS DESIGNATED FOR SPOT REPLACEMENT, SAWCUT CURB A MIN OF 1' PAST DAMAGED SECTION AND REPLACE CURB. TOP OF CURB TO MATCH EXISTING CURB ELEVATION AT TRANSITION.

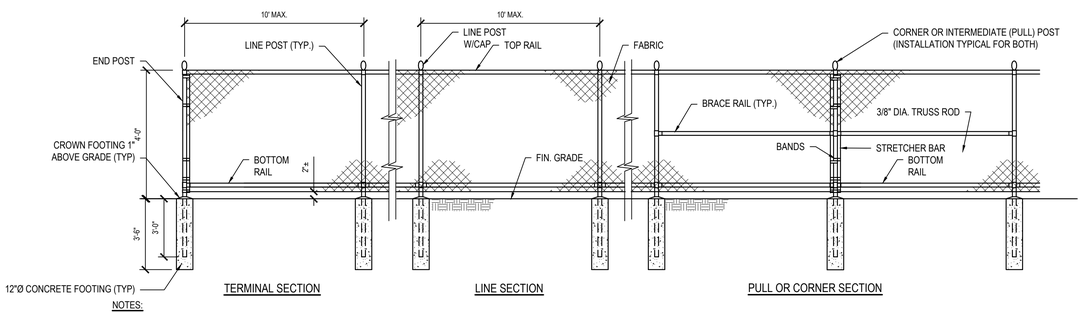
8 Asphalt Curb - Vertical Faced Type

NTS



9 Inductance Loop

SCALE: NTS

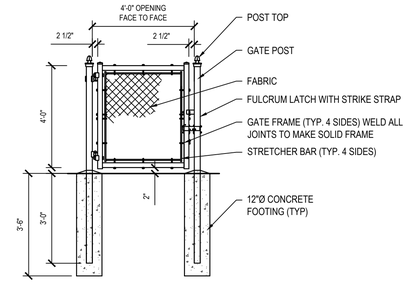


NOTES:

1. FABRIC: ASTM A392, 2" MESH, 9 GAUGE STEEL CORE CHAIN LINK FENCE FABRIC. ASTM A641 GALVANIZED STEEL CORE WIRE, ZINC COATED TO 0.3 OZ/SF WITH 7-12 MIL PVC COATING IN ACCORDANCE WITH ASTM F668 CLASS 2B.
2. TOP AND BRACE RAILS: ASTM F1043 1.66" O.D. (1.84 LBS./FT.) SS40 STEEL PIPE. HOT DIPPED GALVANIZED TO 1.8 OZ/SF IN ACCORDANCE WITH ASTM A123. SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043
3. LINE POSTS: ASTM F1043 1.9" O.D. (2.28 LBS./FT.) SS40 STEEL PIPE. HOT DIPPED GALVANIZED TO 1.8 OZ/SF IN ACCORDANCE WITH ASTM A123 .SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
4. END, CORNER & PULL POSTS: ASTM F1043 2.375" O.D. (3.12 LBS./FT.) SS40 STEEL PIPE. HOT DIPPED GALVANIZED TO 1.8 OZ/SF IN ACCORDANCE WITH ASTM A123. SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
5. FITTINGS AND ACCESSORIES: ASTM F626 MALLEABLE OR PRESSED STEEL. HOT DIPPED GALVANIZED TO 1.2 OZ/SF. SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
6. BOTTOM TENSION WIRE: ASTM A824 NO. 7 GAUGE STEEL-MARCELLED WIRE, ZINC COATED TO 0.4 OZ/SF WITH 7-12 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1664.
7. VINYL COATING COLOR: TO BE SELECTED BY OWNER.
8. CONCRETE TO ACHIEVED 4000 PSI STRENGTH AT 28 DAYS.

10 Chain Link Fence - Vinyl Coated - 4' Height

SCALE: NTS 323113.15 H2MX1



NOTES:

1. FABRIC: ASTM A392, 2" MESH, 9 GAUGE STEEL CHAIN LINK FENCE FABRIC. ASTM A641 GALVANIZED STEEL CORE WIRE, ZINC COATED TO 0.3 OZ/SF WITH 7-12 MIL PVC COATING IN ACCORDANCE WITH ASTM F668, CLASS 2B.
2. FRAME: ASTM F900, 1.9" O.D. (2.28 LBS./FT.) STEEL PIPE. HOT DIPPED GALVANIZED TO 1.8 OZ/SF IN ACCORDANCE WITH ASTM A123. SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
3. GATE POST: ASTM F1043, 2.375" O.D. (3.1 LBS/FT) SS40 STEEL PIPE. HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123. SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
4. HINGES: ASTM F900, NON-LIFT-OFF TYPE.
5. LATCH: ASTM F900 FORKED TYPE GRAVITY DROP WITH PROVISION FOR PADLOCK.
6. FITTINGS AND ACCESSORIES: ASTM F 626, MALLEABLE OR PRESSED STEEL, HOT DIPPED GALVANIZED TP 1.2 OZ/SF. SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
7. GATE KEEPER: ASTM F900.
8. PROVIDE GATE KEEPER FOR EACH SWING GATE.
9. VINYL COATING COLOR TO BE SELECTED BY OWNER.
10. CONCRETE TO ACHIEVE 4,000 PSI STRENGTH AT 28 DAYS.

11 Chain Link Swing Gate - Vinyl Coated - 4' Height

SCALE: NTS | H2M X1 323113.21

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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · SEAN PATRICK CALLAHAN · 092068-1 · LICENSED PROFESSIONAL ENGINEER

08/31/2027 EXP. DATE

SEAN P. CALLAHAN, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 092068

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
S. PETERS	A. SODERMAN	B. LEDGER	S. CALLAHAN

PROJECT No.:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202, SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT C CIVIL / SITE CONSTRUCTION

STATUS

SED SUBMISSION

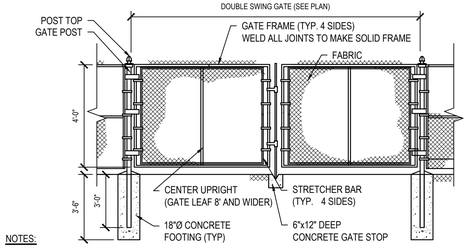
SHEET TITLE

SITE DETAILS

DRAWING No.

SI-C 501.00

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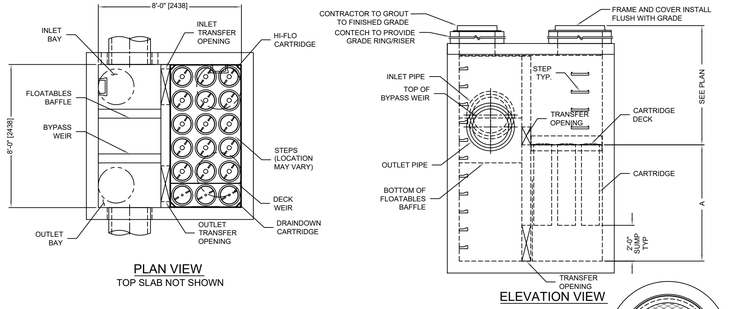
NOTES:

1. FABRIC: ASTM A392, 2" MESH, 9 GAUGE STEEL CHAIN LINK FENCE FABRIC. ASTM A641 GALVANIZED STEEL CORE WIRE, ZINC COATED TO 0.3 OZ/SF WITH 7-12 MIL PVC COATING IN ACCORDANCE WITH ASTM F668, CLASS 2B.
2. FRAME: ASTM F900, 1.66" O.D. (1.83 LBS./FT.) STEEL PIPE. HOT DIPPED GALVANIZED TO 1.8 OZ/SF IN ACCORDANCE WITH ASTM A123 (SEE TABLE FOR SIZE AND WEIGHT). SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
3. GATE POST: ASTM F1043, SS40 STEEL PIPE. HOT DIPPED GALVANIZED TO 1.8 OZ/SF IN ACCORDANCE WITH ASTM A123 (SEE TABLE FOR SIZE AND WEIGHT). SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
4. HINGES: ASTM F900, NON-LIFT-OFF TYPE.
5. LATCH: ASTM F900 FORKED TYPE GRAVITY DROP WITH PROVISION FOR PADLOCK.
6. FITTINGS AND ACCESSORIES L: ASTM F 626, MALLEABLE OR PRESSED STEEL, HOT DIPPED GALVANIZED TP 1.2 OZ/SF. SUPPLEMENTAL 10-15 MIL PVC POWDER COATING IN ACCORDANCE WITH ASTM F1043.
7. GATE KEEPER: ASTM F900.
8. PROVIDE GATE KEEPER FOR EACH SWING GATE.
9. VINYL COATING COLOR TO BE SELECTED BY OWNER.
10. CONCRETE TO ACHIEVE 4,000 PSI STRENGTH AT 28 DAYS.

SINGLE GATE LEAF WIDTH	GATE POST OUTSIDE DIAMETER (INCHES)	MINIMUM WEIGHT (LB/FT)
UP TO 4'	2.375	3.12
5' TO 10'	2.875	4.64
11' TO 18'	4.000	6.56

1 Chain Link Double Swing Gate - Vinyl Coated - 4' Height

SCALE: NTS | H2M X1 323113.25



PLAN VIEW
TOP SLAB NOT SHOWN

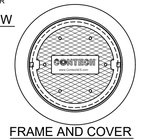
ELEVATION VIEW

JELLYFISH DESIGN NOTES		
CARTRIDGE SIZE	54	JELLYFISH TREATMENT CAPACITY IS A FUNCTION OF THE CARTRIDGE SIZE, TYPE AND QUANTITY. THE STANDARD PEAK DIVERSION VAULT STYLE WITH PRECAST TOP SLAB IS SHOWN. THE 8' x 8' JELLYFISH PEAK TREATMENT CAPACITY IS 2.94 CFS. MAXIMUM BYPASS CAPACITY IS DETERMINED BY CONTECH ENGINEERED SOLUTIONS. IF THE SITE CONDITIONS EXCEED THE TOTAL BYPASS CAPACITY OF THE SYSTEM, AN UPSTREAM DIVERSION STRUCTURE IS REQUIRED
FLOW RATE HIGH-FLO / DRAINDOWN (cfs [L/s])	0.178/0.089 [5.10/2.55]	
MAXIMUM CARTRIDGE QUANTITY, HI-FLO / DRAINDOWN	15/3	
MAXIMUM TREATMENT	2.94 [83.25]	
OUTLET INVERT TO STRUCTURE INVERT	SEE PLAN	
FINISHED GRADE TO OUTLET INVERT (SHALLOW) (B)	N/A	
FINISHED GRADE TO OUTLET INVERT (STANDARD) (B) (ft. [mm])	5.67 [1727]	

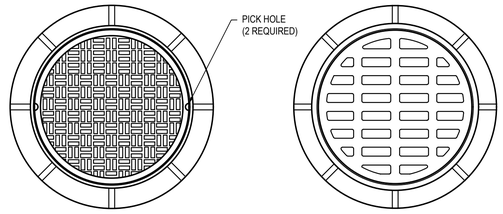
GENERAL NOTES:
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE. INSTALL PER MANUFACTURER SPECIFICATION.
2. JELLYFISH WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
3. STRUCTURE SHALL MEET AASHTO HS-20 OR PER APPROVING JURISDICTION REQUIREMENTS, WHICHEVER IS MORE STRINGENT.CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.
4. STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-857, ASTM C-918, AND AASHTO LOAD FACTOR DESIGN METHOD.
5. OUTLET PIPE INVERT IS EQUAL TO THE CARTRIDGE DECK ELEVATION. THE OUTLET PIPE DIAMETER FOR NEW INSTALLATIONS IS RECOMMENDED TO BE ONE PIPE SIZE LARGER THAN THE INLET PIPE AT EQUAL OR GREATER
6. THE OWNER IS RESPONSIBLE FOR MAINTAINING THE JELLYFISH SYSTEM IN ACCORDANCE WITH THE MANUFACTURERS RECCOMENDATIONS WHICH CAN BE FOUND IN APPENDIX C OF THE SWPPP REPORT.

2 MTD (Jellyfish JFPD0808)

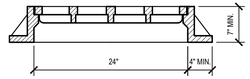
SCALE: NTS



FRAME AND COVER
STANDARD TOP
NOT TO SCALE



PLAN PLAN



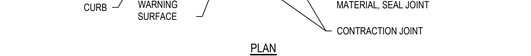
NOTE:

CASTINGS MUST BE CAST IRON CAPABLE OF SUPPORTING THE AASHTO HS-20 HIGHWAY LOADING.

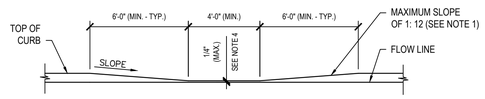
SECTION

3 Circular Frame & Cover or Grate - Heavy Duty

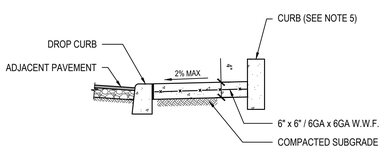
SCALE: NTS | H2M X5 334913.23



PLAN



ELEVATION



SECTION

NOTES:

1. DIMENSIONS SHOWN ARE APPLICABLE FOR INSTALLATION WITH 6" CURB REVEAL. DIMENSIONS OF FLARE AND RAMP LENGTH FOR INSTALLATION WITH ALTERNATE CURB REVEALS MAY BE MODIFIED TO MAINTAIN A RAMP SLOPE NOT TO EXCEED 1:12.
2. THE SIZE OF THE DETECTABLE WARNING FIELD SHALL BE 24" IN THE DIRECTION OF TRAVEL AND SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP EXCLUSIVE OF SIDE FLARES.
3. MAXIMUM SLOPE OF LANDING IS 2% IN ANY DIRECTION.
4. RAMP TRANSITIONS BETWEEN WALKS, GUTTERS, OR STREETS SHALL BE FLUSH AND FREE OF ABRUPT VERTICAL CHANGES (1/4" MAX)
5. OMIIT CURB FOR INSTALLATIONS ADJACENT TO BUILDING FOUNDATIONS.
6. CONCRETE TO ACHIEVE 4,000 P.S.I. STRENGTH AT 28 DAYS.
7. COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D1557.
8. APPLY BRUSH FINISH PERPENDICULAR TO DIRECTION OF SLOPE.
9. REFER TO CONCRETE SIDEWALK DETAIL FOR INFORMATION REGARDING CONTRACTION AND EXPANSION JOINTS.

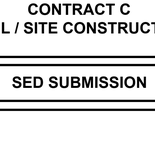
4 Concrete Handicap Ramp - Mid Block - Parallel

SCALE: NTS (321313.36 H2MX3) - U

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CONSULTANTS:

MARK	DATE	DESCRIPTION



08/31/2027
EXP. DATE

SEAN P. CALLAHAN, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 092068

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S. PETERS	A. SODERMAN	B. LEDGER	S. CALLAHAN

PROJECT No.:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202,
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT C
CIVIL / SITE CONSTRUCTION

STATUS

SED SUBMISSION

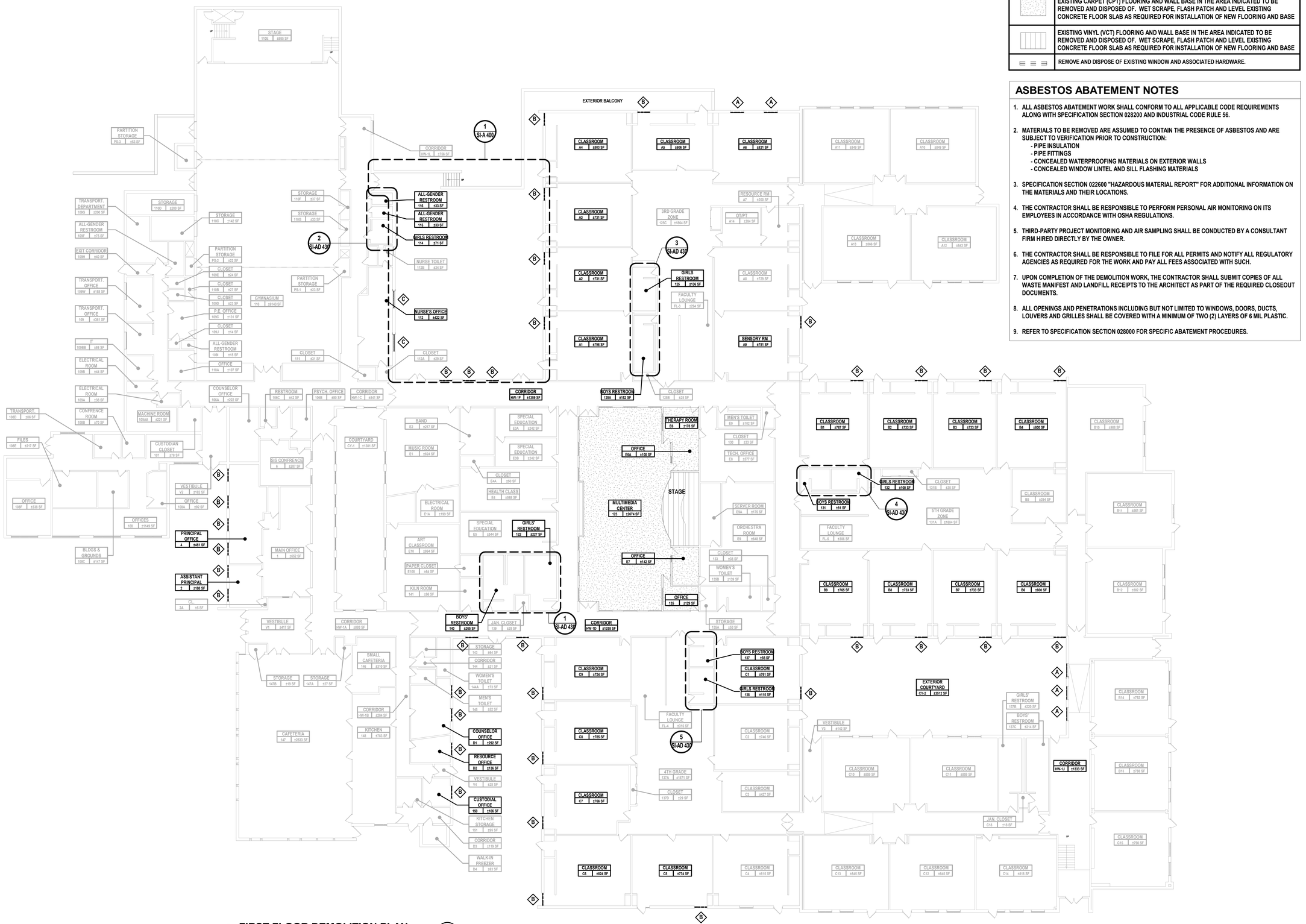
SHEET TITLE

SITE DETAILS

DRAWING No.

SI-C 502.00

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DEMOLITION LEGEND

A	INDICATED WINDOW TAGS FOR WORK IN CONTRACT - FIELD VERIFY ALL WINDOW SIZES
	EXISTING CARPET (CPT) FLOORING AND WALL BASE IN THE AREA INDICATED TO BE REMOVED AND DISPOSED OF. WET SCRAPE, FLASH PATCH AND LEVEL EXISTING CONCRETE FLOOR SLAB AS REQUIRED FOR INSTALLATION OF NEW FLOORING AND BASE
	EXISTING VINYL (VCT) FLOORING AND WALL BASE IN THE AREA INDICATED TO BE REMOVED AND DISPOSED OF. WET SCRAPE, FLASH PATCH AND LEVEL EXISTING CONCRETE FLOOR SLAB AS REQUIRED FOR INSTALLATION OF NEW FLOORING AND BASE
	REMOVE AND DISPOSE OF EXISTING WINDOW AND ASSOCIATED HARDWARE.

ASBESTOS ABATEMENT NOTES

1. ALL ASBESTOS ABATEMENT WORK SHALL CONFORM TO ALL APPLICABLE CODE REQUIREMENTS ALONG WITH SPECIFICATION SECTION 028200 AND INDUSTRIAL CODE RULE 56.
2. MATERIALS TO BE REMOVED ARE ASSUMED TO CONTAIN THE PRESENCE OF ASBESTOS AND ARE SUBJECT TO VERIFICATION PRIOR TO CONSTRUCTION:
   - PIPE INSULATION
   - PIPE FITTINGS
   - CONCEALED WATERPROOFING MATERIALS ON EXTERIOR WALLS
   - CONCEALED WINDOW LINTEL AND SILL FLASHING MATERIALS
3. SPECIFICATION SECTION 022600 "HAZARDOUS MATERIAL REPORT" FOR ADDITIONAL INFORMATION ON THE MATERIALS AND THEIR LOCATIONS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM PERSONAL AIR MONITORING ON ITS EMPLOYEES IN ACCORDANCE WITH OSHA REGULATIONS.
5. THIRD-PARTY PROJECT MONITORING AND AIR SAMPLING SHALL BE CONDUCTED BY A CONSULTANT FIRM HIRED DIRECTLY BY THE OWNER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE TO FILE FOR ALL PERMITS AND NOTIFY ALL REGULATORY AGENCIES AS REQUIRED FOR THE WORK AND PAY ALL FEES ASSOCIATED WITH SUCH.
7. UPON COMPLETION OF THE DEMOLITION WORK, THE CONTRACTOR SHALL SUBMIT COPIES OF ALL WASTE MANIFEST AND LANDFILL RECEIPTS TO THE ARCHITECT AS PART OF THE REQUIRED CLOSEOUT DOCUMENTS.
8. ALL OPENINGS AND PENETRATIONS INCLUDING BUT NOT LIMITED TO WINDOWS, DOORS, DUCTS, LOUVERS AND GRILLES SHALL BE COVERED WITH A MINIMUM OF TWO (2) LAYERS OF 6 MIL PLASTIC.
9. REFER TO SPECIFICATION SECTION 028000 FOR SPECIFIC ABATEMENT PROCEDURES.

1 **FIRST FLOOR DEMOLITION PLAN**
SCALE: 1/16" = 1'-0"

PROJECT NORTH

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CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

Katrina N. Pacheco 09/30/2029
KATRINA N. PACHECO, R.A. — Exp. Date
NY PROFESSIONAL ARCHITECT Lic. No. 041183

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
L. RAUSCHER	L. RAUSCHER	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2505	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

FIRST FLOOR DEMOLITION PLAN

DRAWING No.

SI-AD 100.00

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CEILING DEMOLITION LEGEND

	REMOVE 2X4 CEILING SYSTEM IN ITS ENTIRETY		EXISTING 2X2 LIGHTS TO REMAIN
	REMOVE 2X2 CEILING SYSTEM IN ITS ENTIRETY	NO.	ROOM TAG
	REMOVE TILE CEILING SYSTEM IN ITS ENTIRETY		EXISTING MECHANICAL SUPPLY
	REMOVE SOFFIT CEILING, SUPPORT MEMBERS TO REMAIN		EXISTING MECHANICAL RETURN
	EXISTING 2X4 LIGHTS TO REMAIN		

DEMOLITION NOTES

1. COMPLETELY REMOVE AND DISPOSE OF EXISTING SUSPENDED CEILING SYSTEM IN ITS ENTIRETY INCLUDING BUT NOT LIMITED TO CEILING TILES AND TRIM, RUNNERS, MAIN TEES, WALL TRIM, WIRE HANGERS, FASCIA PANELS, AND ALL DEVICES USED TO SECURE THE CEILING IN PLACE.
2. THE GENERAL CONTRACTOR SHALL REMOVE, STORE, AND PROTECT ALL EXISTING CEILING-MOUNTED DEVICES (EXIT SIGNS, OCCUPANCY SENSORS, SMOKE DETECTORS, SPEAKERS, ETC.). THESE DEVICES ARE TO BE REINSTALLED IN THEIR PREVIOUS LOCATIONS AFTER THE INSTALLATION OF THE NEW CEILING SYSTEM. SEE "E" DRAWINGS FOR ADDITIONAL INFORMATION.

1 FIRST FLOOR REFLECTED CEILING DEMOLITION PLAN
SCALE: 1/16" = 1'-0"

PROJECT NORTH

H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, NY 10605
914.358.5623 • www.h2m.com
NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

09/30/2029
KATRINA N. PACHECO, R.A.
NY PROFESSIONAL ARCHITECT Lic. No. 041183 — Exp. Date

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L. RAUSCHER	C. HENRY	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2505	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

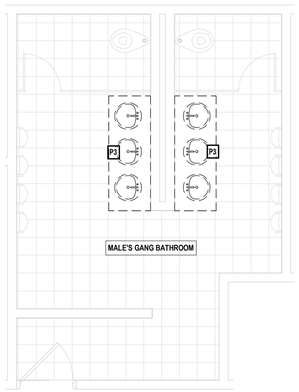
CONTRACT
CONTRACT G
GENERAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
FIRST FLOOR REFLECTED CEILING DEMOLITION PLAN

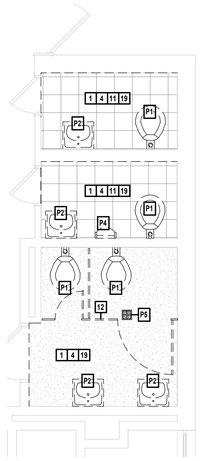
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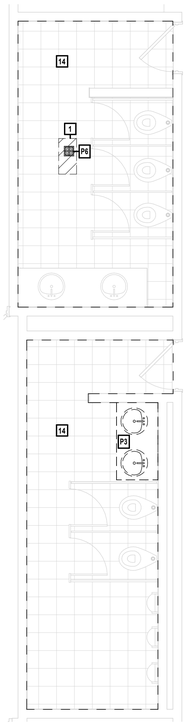
1 MALE GANG RESTROOM - DEMOLITION
SCALE: 1/4" = 1'-0"

PROJECT NORTH



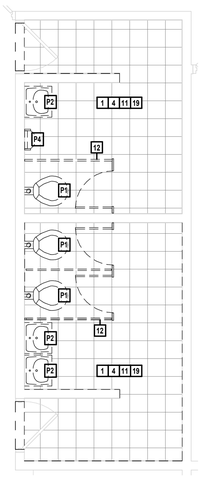
2 RESTROOMS - NURSE HALLWAY - DEMOLITION
SCALE: 1/4" = 1'-0"

PROJECT NORTH



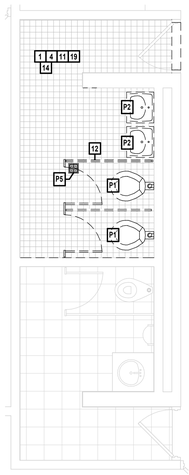
5 THIRD GRADE WING RESTROOMS - DEMOLITION
SCALE: 1/4" = 1'-0"

PROJECT NORTH



7 FOURTH GRADE WING RESTROOMS - DEMOLITION
SCALE: 1/4" = 1'-0"

PROJECT NORTH



6 FIFTH GRADE WING RESTROOMS - DEMOLITION
SCALE: 1/4" = 1'-0"

PROJECT NORTH

DEMOLITION NOTES - CONTRACT G

1	FLOOR FINISH	EXISTING TILE FLOOR TO BE REMOVED AND ABATE COMPLETELY DOWN TO EXISTING CONCRETE FLOOR SLAB BELOW. REMOVELS SHALL INCLUDE TILE, MASTIC, GROUT, REINFORCING MESH, AND ALL DEVICES / MATERIALS USED TO SECURE THE TILE FINISH IN PLACE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTING THE CONDITION OF THE SLAB, PATCH AND LEVEL AS NEEDED TO ENSURE A LEVEL FLOOR FREE OF DIPS, WAVES, DEPRESSIONS, AND TELEGRAPHING OF THE LEVELING COMPOUND AND IMPERFECTIONS IN THE SLAB FROM BELOW AS REQUIRED TO ENSURE A LEVEL SURFACE FOR NEW FINISHES.
4	TOILET ACCESSORIES	REMOVE AND DISPOSE OF ALL EXISTING TOILET ACCESSORIES (MIRRORS, SOAP DISPENSERS, HAND DRYERS, ETC.) & ALL SUPPORTING HARDWARE. PREPARE ALL WALLS TO RECEIVE NEW FINISHES INCLUDING FILLING HOLES, REPAIRING CRACKS IN EXISTING WALLS, SANDING, AND PREPARING ALL SURFACES FOR A NEW TILE FINISH. PATCH AND PAINT ANY UNUSED HOLES PRIOR TO COMPLETION OF THE PROJECT.
11	WALL TILE AND BASE	CONTRACTOR SHALL COMPLETELY ABATE, REMOVE AND DISPOSE OF ALL EXISTING CERAMIC WALL TILE COMPLETELY DOWN TO THE EXISTING MASONRY BACK UP WALL BELOW. REMOVALS SHALL INCLUDE TILE, THINSET, MORTAR SETTING BED, GROUT, REINFORCED MESH, TRIM, AND ALL DEVICES USED TO SECURE THE TILE IN PLACE. THE CONTRACTOR SHALL PREPARE WALL FOR NEW CERAMIC WALL TILE FINISH.
12	PARTITION SYSTEM	REMOVE AND DISPOSE OF EXISTING TOILET PARTITION SYSTEM
14	ACT CEILING	REMOVE AND DISPOSE OF EXISTING 2 x 4 GRID CEILING AND ALL ASSOCIATED HANGERS AND SUPPORTS.
19	WALL / DOOR FRAME PAINT	SCRAPE PAINT FROM WALLS AND DOOR FRAME. PREPARE WALLS AND DOOR FRAME FOR NEW PAINT.

GENERAL DEMOLITION NOTES

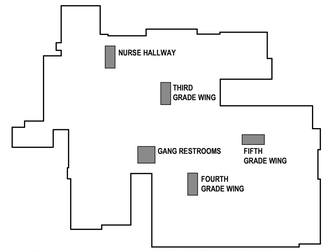
1. ALL DEMOLITION WORK SHALL BE IN COMPLIANCE WITH ALL FEDERAL AND NEW YORK STATE APPLICABLE BUILDING AND LIFE AND SAFETY REGULATIONS.
2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES AND FINISHES OUTSIDE THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE EXISTING CONDITIONS AND/OR FINISHES DAMAGED DURING CONSTRUCTION INCLUDING PATCHING AND PAINTING DEEMED NECESSARY BY THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
3. THE CONTRACTOR SHALL TAKE CARE AS TO ADEQUATELY PROTECT ALL ADJOINING CLASSROOMS, CLOSETS, CORRIDORS, CRITICAL BARRIERS (DUCTS, VENTS, ETC.), AND OTHER SPACES FROM DUST AND DEBRIS DURING THE DEMOLITION AND INSTALLATION OF THE NEW WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO WIPE DOWN AND CLEAN ALL AFFECTED ROOMS UPON COMPLETION OF THE PROJECT.
4. CONTRACTORS SITE ACCESS AND BUILDING ENTRY POINT SHALL BE AS PER DRAWING HS-G 000.00 AND VERIFIED BY OWNER. THE CONTRACTOR SHALL ADEQUATELY PROTECT THE WALLS, FLOOR, AND FINISHES WITHIN STAIRWELLS AND ALL OTHER AREAS USED FOR ACCESS TO CONTRACT AREAS FROM DAMAGE DURING THE PROJECT DURATION. THE CONTRACTOR SHALL BE RESPONSIBLE TO PATCH & RESTORE ALL SURFACES DAMAGED DURING CONSTRUCTION TO THE SATISFACTION OF THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
5. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL OFF SITE IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.
6. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY DEFECTIVE OR NON-WORKING EQUIPMENT PRIOR TO WORK STARTING AND FOLLOWING INSTALLATION OF NEW FINISHES VERIFY ALL ITEMS ARE IN PROPER WORKING ORDER UPON COMPLETION.
7. THE CONTRACTOR SHALL REVIEW SCOPE OF DEMOLITION WORK WITH OWNER AND COORDINATE WHICH ITEMS WILL BE REMOVED CAREFULLY AND RETURNED TO DISTRICT.
8. CONTRACTOR SHALL COORDINATE WITH THE DISTRICT TO DISCONNECT, REMOVE, AND STORE ALL REMOVABLE EQUIPMENT (INCLUDING CASEWORK, DESKS, CHAIRS, ETC.) TO PERFORM ALL REQUIRED DEMOLITION. UPON COMPLETION, CONTRACTOR SHALL REINSTALL ALL EQUIPMENT AND ENSURE PROPER WORKING CONDITION. CLEAN ALL SURFACES PRIOR TO SUBSTANTIAL COMPLETION.
9. PROTECTING EXISTING CEILING LIGHTING FIXTURES, INCLUDING, BUT NOT LIMITED TO THE FIXTURE, TRIM, SUPPORTS, AND ALL DEVICES USED TO SECURE THE LIGHTING IN PLACE.

DEMOLITION PLAN LEGEND
(NOT ALL MAY BE USED)

	INDICATES WALL TO BE REMOVED AND DISPOSED OF. SEE DEMOLITION NOTES FOR ADDITIONAL INFORMATION
	INDICATES EXISTING WALL TO REMAIN
	INDICATES EXISTING DOOR TO BE REMOVED AND DISPOSED OF. SEE DEMOLITION NOTES FOR ADDITIONAL INFORMATION
	INDICATES EXISTING TOILET PARTITIONS TO BE REMOVED AND DISPOSED OF. SEE DEMOLITION NOTES FOR ADDITIONAL INFORMATION

DEMOLITION NOTES - CONTRACT P

P1	FLOOR MOUNTED TOILET	REMOVE AND DISPOSE OF EXISTING TOILET.
P2	WALL HUNG SINGLE SINK	REMOVE AND DISPOSE OF EXISTING SINK AND CARRIER ARMS.
P3	SINK AND VANITY	REMOVE AND DISPOSE OF EXISTING SINK, VANITY, AND PLUMBING.
P4	WALL HUNG URINAL	REMOVE AND DISPOSE OF EXISTING URINAL.
P5	FLOOR DRAIN COVER	REMOVE AND DISPOSE OF EXISTING FLOOR DRAIN COVER.



KEY PLAN - AREAS OF WORK
SCALE: 1" = 100'-0"

PROJECT NORTH

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CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

09/30/2029
KATRINA N. PACHECO, R.A.
NY PROFESSIONAL ARCHITECT Lic. No. 041183
Exp. Date

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
M. LUCK	M. LUCK	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-XXX

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

RESTROOM UPGRADES DEMOLITION PLANS

DRAWING No.

SI-AD 430.00

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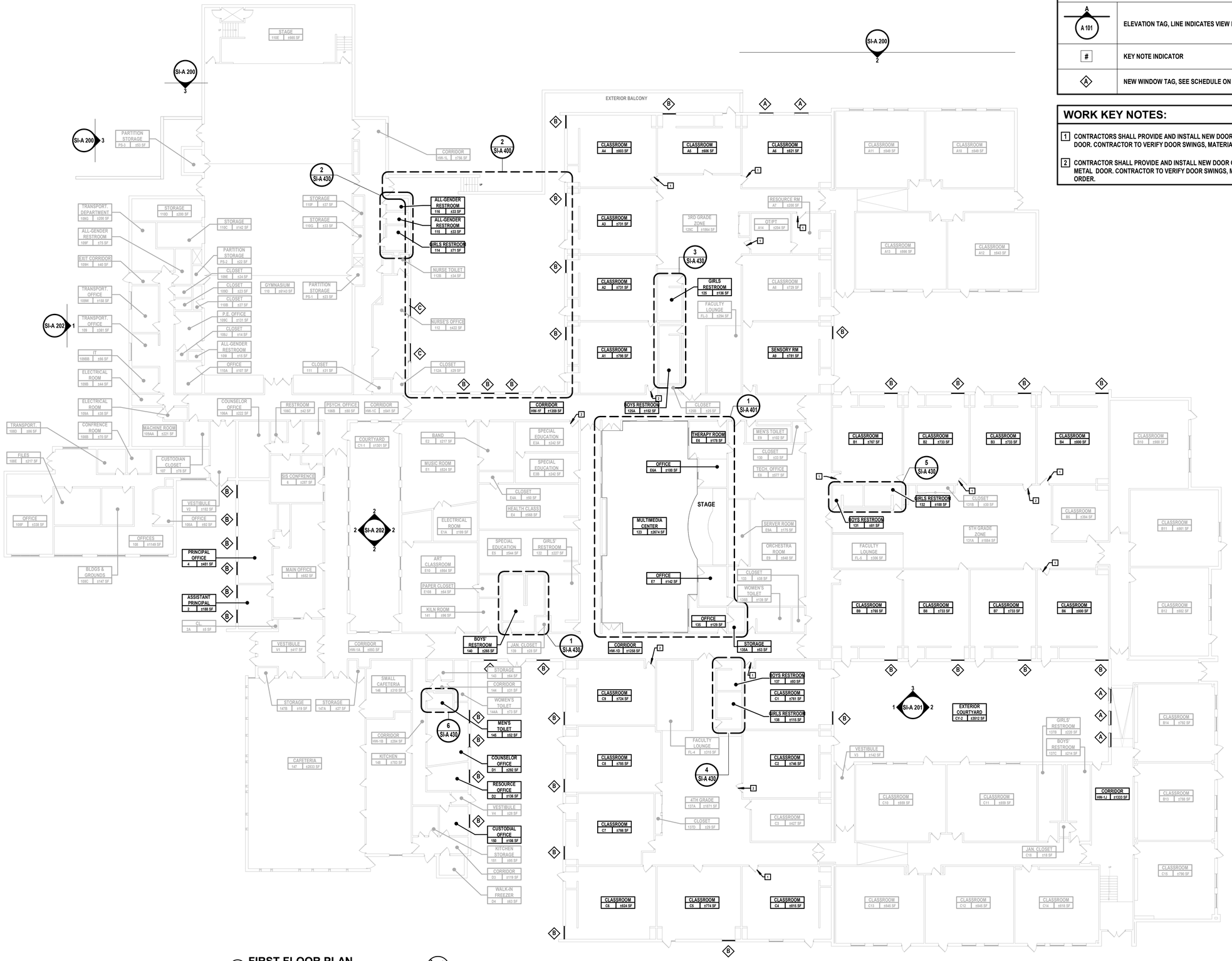
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LEGEND

A / A 101	ELEVATION TAG, LINE INDICATES VIEW EXPANSE
#	KEY NOTE INDICATOR
A	NEW WINDOW TAG, SEE SCHEDULE ON SI-A 610 FOR MORE INFORMATION

WORK KEY NOTES:

1. CONTRACTORS SHALL PROVIDE AND INSTALL NEW DOOR CLOSER FOR EXISTING WOOD DOOR. CONTRACTOR TO VERIFY DOOR SWINGS, MATERIALS, AND SIZES PRIOR TO ORDER.
2. CONTRACTOR SHALL PROVIDE AND INSTALL NEW DOOR CLOSER FOR EXISTING HOLLOW METAL DOOR. CONTRACTOR TO VERIFY DOOR SWINGS, MATERIALS, AND SIZES PRIOR TO ORDER.



1 **FIRST FLOOR PLAN**
SCALE: 1/16" = 1'-0"

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L. RAUSCHER	L. RAUSCHER	S.MANDIC	K. PACHECO

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SOMERS CENTRAL SCHOOL DISTRICT

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SHEET TITLE

FIRST FLOOR PLAN

DRAWING No.

SI-A 100.00

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CEILING LEGEND

	INDICATED AREA OF NEW CEILING GRID WITH NEW 2'x2' CEILING GRID AND PANEL SYSTEM	NO.	ROOM TAG
			EXISTING MECHANICAL SUPPLY TO REMAIN
	NEW SOFFIT CEILING		EXISTING MECHANICAL RETURN TO REMAIN
	EXISTING 2X4 LIGHTS TO REMAIN		
	EXISTING 2X2 LIGHTS TO REMAIN		

GENERAL WORK NOTES

1. THE CONTRACTOR SHALL FIELD VERIFY EXACT LAYOUT COMPATIBILITY WITH ALL EXISTING CONDITIONS BEFORE BEGINNING WORK.
2. ALL EXISTING CEILING-MOUNTED DEVICES (EXIT SIGNS, OCCUPANCY SENSORS, SMOKE DETECTORS, SPEAKERS, ETC.) WHICH WERE REMOVED, STORED AND PROTECTED ARE TO BE REINSTALLED IN THEIR PREVIOUS LOCATIONS AFTER THE INSTALLATION OF THE NEW CEILING SYSTEM BY THE CONTRACTOR. COORDINATE WITH ELECTRICAL CONTRACTOR FOR ADDITIONAL INFORMATION.

1 **FIRST FLOOR PLAN**
SCALE: 1/16" = 1'-0"

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Katrina N. Pacheco 09/30/2029
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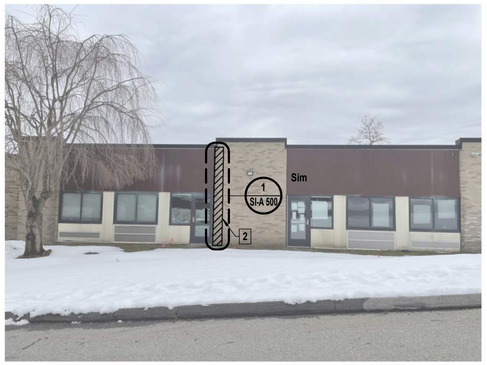
FIRST FLOOR REFLECTED CEILING PLAN

DRAWING No.

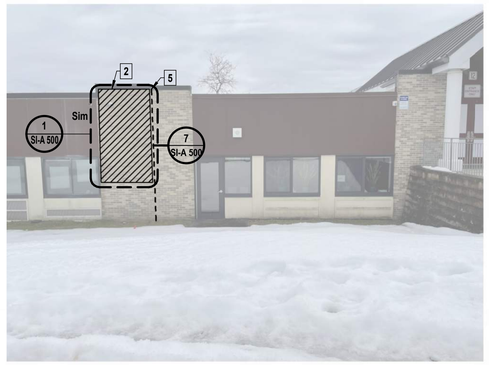
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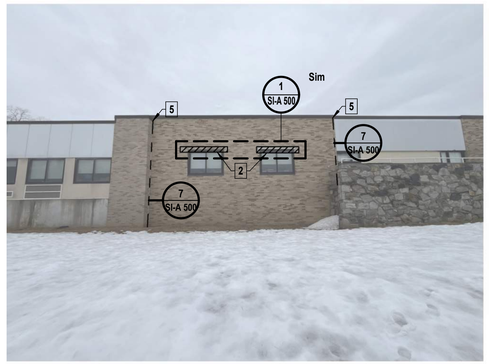


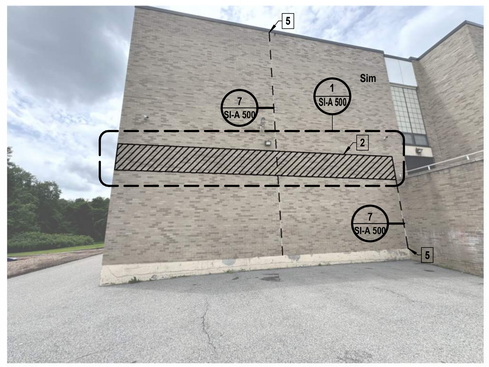
1 NORTH ELEVATION @ C-WING
SCALE: 1/4" = 1'-0"





2 SOUTH ELEVATION @ A-WING
SCALE: 1/4" = 1'-0"





3 EAST ELEVATION @ GYMNASIUM
SCALE: 1/4" = 1'-0"

GENERAL CONSTRUCTION WORK NOTES:

1. ALL EXISTING EXTERIOR FACADE MOUNTED EQUIPMENT INCLUDING BUT NOT LIMITED TO LIGHT FIXTURES, SECURITY DEVICES, SIGNAGE, ETC. SHALL BE PROTECTED DURING SCOPE OF WORK. CONTRACTOR SHALL REPAIR OR REPLACE EQUIPMENT OR DEVICE AS NEEDED IF DAMAGED. CONTRACTOR SHALL HAVE A LICENSED ELECTRICAL CONTRACTOR TEMPORARILY REMOVE, MAINTAIN AND RECONNECT ANY CONDUIT, WIRING OR DEVICES REQUIRED TO PERFORM ANY SCOPE ASSOCIATED WITH THIS WORK. VERIFY IN FIELD ALL CONDITIONS.
2. ALL MASONRY MORTAR ON SCOPE ELEVATIONS SHALL BE INSPECTED FOR CRACKS OR DAMAGE AND SHALL BE BROUGHT TO THE ARCHITECT AND THE DISTRICTS CONSTRUCTION REPRESENTATIVES ATTENTION IMMEDIATELY.
3. CONTRACTOR SHALL BE RESPONSIBLE TO CLEAN OUT ALL EXISTING WEEP HOLES WHERE WORK IS BEING PERFORMED. REMOVE ALL DIRT, DEBRIS OR OTHER MATERIALS TO MAKE SURE THEY ARE CLEAR TO ENSURE WEEP SYSTEM FUNCTIONALITY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL TEMPORARY BRACING AND SHORING TO MAINTAIN THE STRUCTURAL INTEGRITY OF THE BUILDING, AS REQUIRED TO COMPLETE THE MASONRY REPAIR SCOPE OF WORK.
5. ALL NEW AND EXISTING MASONRY SURFACES SHALL BE LOW-PRESSURE POWER WASHED ACROSS ALL ELEVATIONS AS PART OF THE SCOPE OF WORK. REMOVE ALL DIRT, DEBRIS, STAINS, MOSS AND EFFLORESCENCE. PROTECT ALL OPENINGS INCLUDING BUT NOT LIMITED TO; DOORS, WINDOWS, LOUVERS AND GRILLES DURING POWER WASHING, AS WELL AS ALL WALL-MOUNTED ITEMS REMAINING IN PLACE.
6. ALL EXISTING CAST STONE WITHIN WORK AREA SHALL BE LOW-PRESSURE POWER WASHED. REMOVE ALL DIRT, DEBRIS, STAINS, MOSS AND EFFLORESCENCE. PROTECT ALL OPENINGS INCLUDING BUT NOT LIMITED TO; DOORS, WINDOWS, LOUVERS AND GRILLES DURING POWER WASHING. RAKE OUT EXISTING JOINTS BETWEEN STONE COPINGS AND BRICK AND INSTALL NEW FLEXIBLE SILICONE SOFT JOINT WITH BACKER OR JOINT TAPE TO ENSURE TWO SIDE ADHESION. SILICONE SEALANT WITH BACKER ROD TO MATCH EXISTING MORTAR COLOR.
7. ALL NEW AND EXISTING EXPOSED CAST STONE AND MASONRY SURFACES SHALL BE LOW-PRESSURE POWER WASHED AND ACROSS ALL ELEVATIONS AS PART OF THE SCOPE OF THE WORK. REMOVE ALL DIRT, DEBRIS, STAINS, MOSS, AND EFFLORESCENCE. PROTECT ALL OPENINGS INCLUDING BUT NOT LIMITED TO DOORS, WINDOWS, LOUVERS AND GRILLES, AS WELL AS ALL WALL-MOUNTED ITEMS REMAINING IN PLACE.
8. THESE DRAWINGS SERVE AS A GRAPHICAL REPRESENTATION OF THE INTENDED SCOPE OF THE WORK, AND CONSTITUTE ONE PORTION OF THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION BETWEEN THESE DRAWINGS AND THE SPECIFICATIONS.

PATTERNS & SYMBOLS LEGEND

KEYNOTE	PATTERN	DESCRIPTION
1		SELECTIVE MASONRY REPLACEMENT: REMOVE AND REPLACE DAMAGED / DETERIORATED BRICK MASONRY THROUGHOUT AREA INDICATED. REBUILD BACK-UP AS REQUIRED AND REPLACE ANY UNSOUND MATERIALS THAT ARE REMOVED. INSTALL NEW BRICK MASONRY TO MATCH EXISTING COLOR, FINISH, COURSING AND PATTERN IN COMPLETELY FILLED BED, ENDS, AND HEAD OF MORTAR JOINTS.
2		RE-POINTING: RAKE OUT EXISTING JOINTS TO A MINIMUM DEPTH OF 3/4" THROUGHOUT AREA INDICATED, AND RE-POINT ALL JOINTS IN BRINK MASONRY. REBUILD BACK UP AS REQUIRED AND REPLACE ANY UNSOUND MATERIALS THAT WERE REMOVED. TAKE CARE NOT TO DAMAGE EDGES OF EXISTING MASONRY TO REMAIN.
3		ENVELOPE REPAIR/REPLACEMENT: REMOVE AND REPLACE EXTERIOR ENVELOPE PANELS THROUGHOUT AREA INDICATED IN KIND. COORDINATE WITH ELEVATIONS AND APPLICABLE KEY NOTES FOR SPECIFIC SCOPE WORK.
4		CAST STONE REPAIR/REPLACEMENT: REPOINT EXISTING CAST STONE MORTAR JOINTS. REMOVE AND REPLACE CRACKED, DAMAGED, OR DETERIORATED 4 1/2" THICK CAST STONE IN KIND.
5		CONTROL / EXPANSION JOINT REPLACEMENT: RAKE OUT EXISTING JOINT BETWEEN MASONRY TO A MINIMUM DEPTH OF 1". FURNISH AND INSTALL NEW FLEXIBLE SILICONE SOFT JOINT THE FULL WIDTH, AND LENGTH OF JOINT. COLOR TO MATCH EXISTING MORTAR.
6		ENVELOPE CAULKING REPLACEMENT: EXISTING WINDOW CAULK AND DEBRIS TO BE REMOVED IN ITS ENTIRETY, CONTRACTOR TO CLEAN OPENING AND PROVIDE CAULKING. WINDOW TO BE PROTECTED.

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CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

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240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

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STATUS

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SHEET TITLE

BUILDING ELEVATIONS

DRAWING No.

SI-A 200.00

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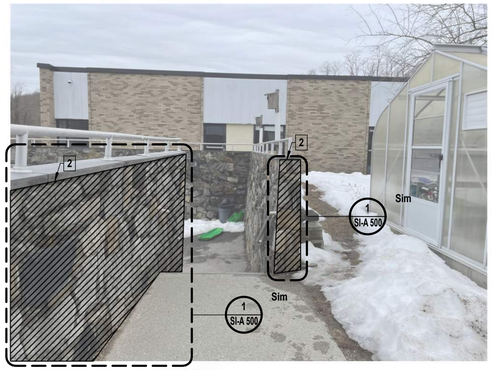
1 EAST ELEVATION @ LARGE COURTYARD
SCALE: 1/4" = 1'-0"



2 WEST ELEVATION @ LARGE COURTYARD
SCALE: 1/4" = 1'-0"



3 SOUTH ELEVATION @ LARGE COURTYARD
SCALE: 1/4" = 1'-0"



5 GREENHOUSE AREA
SCALE: 1/4" = 1'-0"



STONE-WALL REPAIR NOTES:

REMOVE ANY ADJACENT LOOSE STONES CAREFULLY TO AVOID FURTHER DAMAGE. CLEAN THE VOIDS THOROUGHLY, ENSURING THEY ARE FREE OF DUST, DEBRIS, AND ANY LOOSE MATERIALS. COAT THE EMPTY VOIDS WITH MORTAR THAT MATCHES THE EXISTING MORTAR IN COMPOSITION AND APPEARANCE. SET THE STONES BACK INTO THEIR ORIGINAL POSITIONS, APPLYING ADDITIONAL MORTAR AS NEEDED TO SECURE THE STONES AND COMPLETE THE REPLACEMENT IN KIND. ENSURE THE MORTAR IS WORKED FULLY BEHIND AND AROUND EACH STONE FOR PROPER BONDING AND STRUCTURAL INTEGRITY. FINISH BY TOOLING OR SMOOTHING THE MORTAR TO MATCH THE EXISTING JOINT TEXTURE AND APPEARANCE. PROVIDE SHORING AND SUPPORT OF STONES AND WALL AS REQUIRED DURING CONSTRUCTION.

GENERAL CONSTRUCTION WORK NOTES:

1. ALL EXISTING EXTERIOR FACADE MOUNTED EQUIPMENT INCLUDING BUT NOT LIMITED TO LIGHT FIXTURES, SECURITY DEVICES, SIGNAGE, ETC. SHALL BE PROTECTED DURING SCOPE OF WORK. CONTRACTOR SHALL REPAIR OR REPLACE EQUIPMENT OR DEVICE AS NEEDED IF DAMAGED. CONTRACTOR SHALL HAVE A LICENSED ELECTRICAL CONTRACTOR TEMPORARILY REMOVE, MAINTAIN AND RECONNECT ANY CONDUIT, WIRING OR DEVICES REQUIRED TO PERFORM ANY SCOPE ASSOCIATED WITH THIS WORK. VERIFY IN FIELD ALL CONDITIONS.
2. ALL MASONRY MORTAR ON SCOPE ELEVATIONS SHALL BE INSPECTED FOR CRACKS OR DAMAGE AND SHALL BE BROUGHT TO THE ARCHITECT AND THE DISTRICTS CONSTRUCTION REPRESENTATIVES ATTENTION IMMEDIATELY.
3. CONTRACTOR SHALL BE RESPONSIBLE TO CLEAN OUT ALL EXISTING WEEP HOLES WHERE WORK IS BEING PERFORMED. REMOVE ALL DIRT, DEBRIS OR OTHER MATERIALS TO MAKE SURE THEY ARE CLEAR TO ENSURE WEEP SYSTEM FUNCTIONALITY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL TEMPORARY BRACING AND SHORING TO MAINTAIN THE STRUCTURAL INTEGRITY OF THE BUILDING, AS REQUIRED TO COMPLETE THE MASONRY REPAIR SCOPE OF WORK.
5. ALL NEW AND EXISTING MASONRY SURFACES SHALL BE LOW-PRESSURE POWER WASHED ACROSS ALL ELEVATIONS AS PART OF THE SCOPE OF WORK. REMOVE ALL DIRT, DEBRIS, STAINS, MOSS AND EFFLORESCENCE. PROTECT ALL OPENINGS INCLUDING BUT NOT LIMITED TO; DOORS, WINDOWS, LOUVERS AND GRILLES DURING POWER WASHING, AS WELL AS ALL WALL-MOUNTED ITEMS REMAINING IN PLACE.
6. ALL EXISTING CAST STONE WITHIN WORK AREA SHALL BE LOW-PRESSURE POWER WASHED. REMOVE ALL DIRT, DEBRIS, STAINS, MOSS AND EFFLORESCENCE. PROTECT ALL OPENINGS INCLUDING BUT NOT LIMITED TO; DOORS, WINDOWS, LOUVERS AND GRILLES DURING POWER WASHING. RAKE OUT EXISTING JOINTS BETWEEN STONE COPINGS AND BRICK AND INSTALL NEW FLEXIBLE SILICONE SOFT JOINT WITH BACKER OR JOINT TAPE TO ENSURE TWO SIDE ADHESION. SILICONE SEALANT WITH BACKER ROD TO MATCH EXISTING MORTAR COLOR.
7. ALL NEW AND EXISTING EXPOSED CAST STONE AND MASONRY SURFACES SHALL BE LOW-PRESSURE POWER WASHED AND ACROSS ALL ELEVATIONS AS PART OF THE SCOPE OF THE WORK. REMOVE ALL DIRT, DEBRIS, STAINS, MOSS, AND EFFLORESCENCE. PROTECT ALL OPENINGS INCLUDING BUT NOT LIMITED TO DOORS, WINDOWS, LOUVERS AND GRILLES, AS WELL AS ALL WALL-MOUNTED ITEMS REMAINING IN PLACE.
8. THESE DRAWINGS SERVE AS A GRAPHICAL REPRESENTATION OF THE INTENDED SCOPE OF THE WORK, AND CONSTITUTE ONE PORTION OF THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION BETWEEN THESE DRAWINGS AND THE SPECIFICATIONS.

PATTERNS & SYMBOLS LEGEND

KEYNOTE	PATTERN	DESCRIPTION
1		SELECTIVE MASONRY REPLACEMENT: REMOVE AND REPLACE DAMAGED / DETERIORATED BRICK MASONRY THROUGHOUT AREA INDICATED. REBUILD BACK-UP AS REQUIRED AND REPLACE ANY UNSOUND MATERIALS THAT ARE REMOVED. INSTALL NEW BRICK MASONRY TO MATCH EXISTING COLOR, FINISH, COURSING AND PATTERN IN COMPLETELY FILLED BED, ENDS, AND HEAD OF MORTAR JOINTS.
2		RE-POINTING: RAKE OUT EXISTING JOINTS TO A MINIMUM DEPTH OF 3/4" THROUGHOUT AREA INDICATED, AND RE-POINT ALL JOINTS IN BRINK MASONRY. REBUILD BACK UP AS REQUIRED AND REPLACE ANY UNSOUND MATERIALS THAT WERE REMOVED. TAKE CARE NOT TO DAMAGE EDGES OF EXISTING MASONRY TO REMAIN.
3		ENVELOPE REPAIR/REPLACEMENT: REMOVE AND REPLACE EXTERIOR ENVELOPE PANELS THROUGHOUT AREA INDICATED IN KIND. COORDINATE WITH ELEVATIONS AND APPLICABLE KEY NOTES FOR SPECIFIC SCOPE WORK.
4		CAST STONE REPAIR/REPLACEMENT: REPOINT EXISTING CAST STONE MORTAR JOINTS. REMOVE AND REPLACE CRACKED, DAMAGED, OR DETERIORATED 4 1/2" THICK CAST STONE IN KIND.
5		CONTROL / EXPANSION JOINT REPLACEMENT: RAKE OUT EXISTING JOINT BETWEEN MASONRY TO A MINIMUM DEPTH OF 1". FURNISH AND INSTALL NEW FLEXIBLE SILICONE SOFT JOINT THE FULL WIDTH, AND LENGTH OF JOINT. COLOR TO MATCH EXISTING MORTAR.
6		ENVELOPE CAULKING REPLACEMENT: EXISTING WINDOW CAULK AND DEBRIS TO BE REMOVED IN ITS ENTIRETY, CONTRACTOR TO CLEAN OPENING AND PROVIDE CAULKING. WINDOW TO BE PROTECTED.

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CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

09/30/2026
Exp. Date
KATRINA N. PACHECO, R.A.
NY PROFESSIONAL ARCHITECT LIC. No. 041183

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
K.MEDLER	C. HENRY	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2505	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

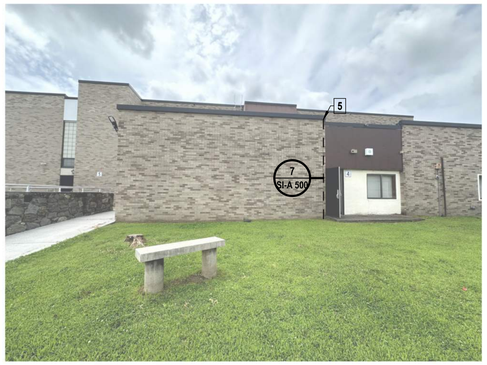
SHEET TITLE

EXTERIOR ELEVATIONS

DRAWING No.

SI-A 201.00

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1 EAST ELEVATION @ TRANSPORTATION DEPARTMENT
SCALE: 1/4" = 1'-0"







2 EAST ELEVATION @ SMALL COURTYARD
SCALE: 1/4" = 1'-0"

GENERAL CONSTRUCTION WORK NOTES:

1. ALL EXISTING EXTERIOR FACADE MOUNTED EQUIPMENT INCLUDING BUT NOT LIMITED TO LIGHT FIXTURES, SECURITY DEVICES, SIGNAGE, ETC. SHALL BE PROTECTED DURING SCOPE OF WORK. CONTRACTOR SHALL REPAIR OR REPLACE EQUIPMENT OR DEVICE AS NEEDED IF DAMAGED. CONTRACTOR SHALL HAVE A LICENSED ELECTRICAL CONTRACTOR TEMPORARILY REMOVE, MAINTAIN AND RECONNECT ANY CONDUIT, WIRING OR DEVICES REQUIRED TO PERFORM ANY SCOPE ASSOCIATED WITH THIS WORK. VERIFY IN FIELD ALL CONDITIONS.
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CONSULTANTS:

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C. HENRY	C. HENRY	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2505	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

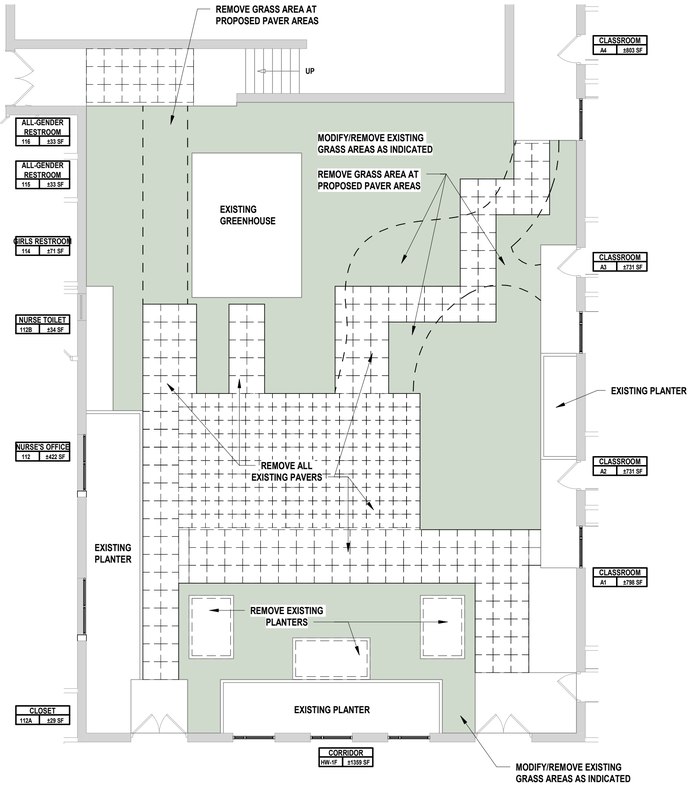
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GENERAL CONSTRUCTION

STATUS
SED SUBMISSION

SHEET TITLE
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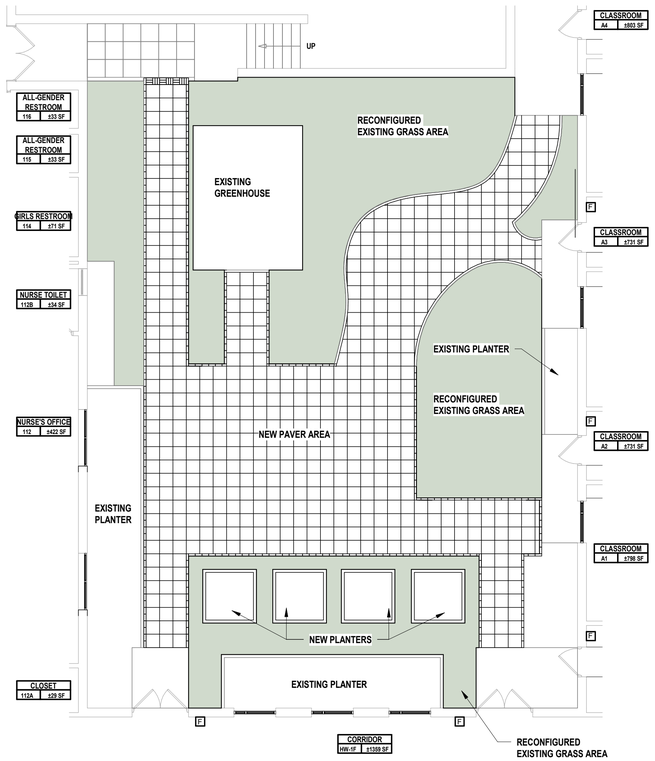
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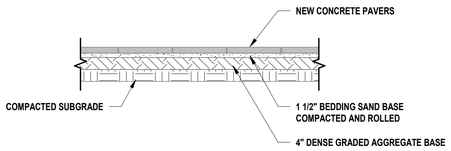
1 ENLARGED OUTDOOR LEARNING SPACE DEMOLITION PLAN

SCALE: 1/8" = 1'-0"



2 ENLARGED OUTDOOR LEARNING SPACE PROPOSED PLAN

SCALE: 1/8" = 1'-0"



NOTES:
1. COMPACT SUBGRADE TO 92% MAXIMUM DENSITY IN ACCORDANCE WITH ASTM 1557

3 CONCRETE PAVER DETAIL

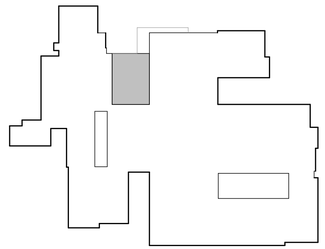
SCALE: 1/2" = 1'-0"

OUTDOOR LEARNING SPACE LEGEND

	AREA OF EXISTING PAVERS TO BE REMOVED		AREA OF GRASS
	AREA OF NEW CONCRETE PAVERS TO BE INSTALLED	NAME 101 SF	ROOM TAG

DEMOLITION NOTES

1. COMPLETELY REMOVE AND DISPOSE OF EXISTING PAVERS IN ITS ENTIRETY
2. THE GENERAL CONTRACTOR SHALL PROTECT ALL EXISTING GRASS AREAS AND PLANTERS NOT INDICATED TO BE REMOVED OR MODIFIED



KEY PLAN - OUTDOOR LEARNING SPACE

SCALE: 1" = 100'-0"

PROJECT NORTH

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Katrina N. Pacheco 09/30/2029
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L. RAUSCHER	L. RAUSCHER	S.MANDIC	K. PACHECO

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SOMERS CENTRAL SCHOOL DISTRICT

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SOMERS, NY 10589

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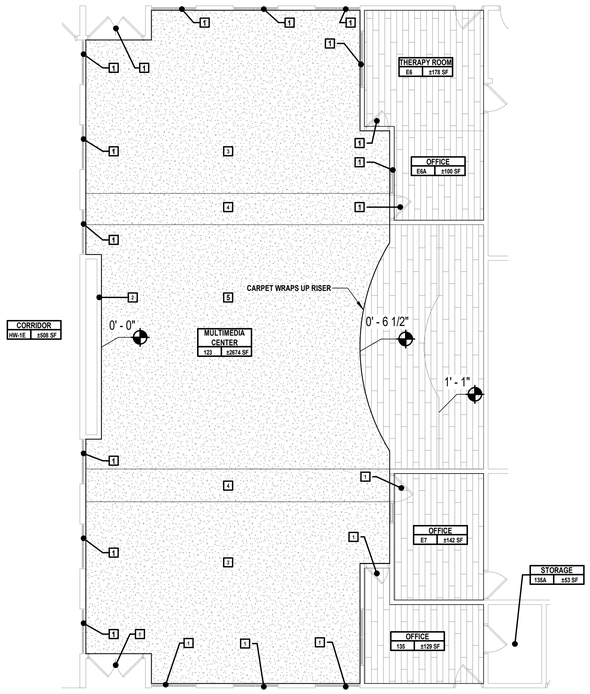
ENLARGED DEMO & PROPOSED OUTDOOR LEARNING SPACE PLANS

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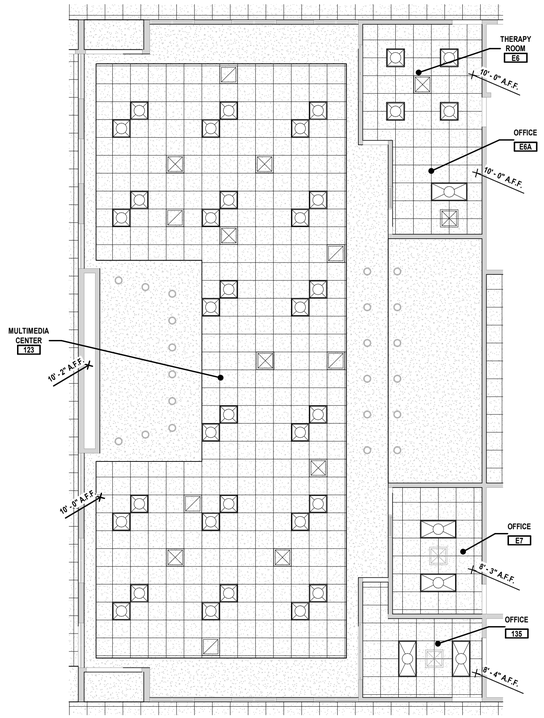
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1 ENLARGED MULTIMEDIA CENTER PLAN

SCALE: 1/8" = 1'-0"

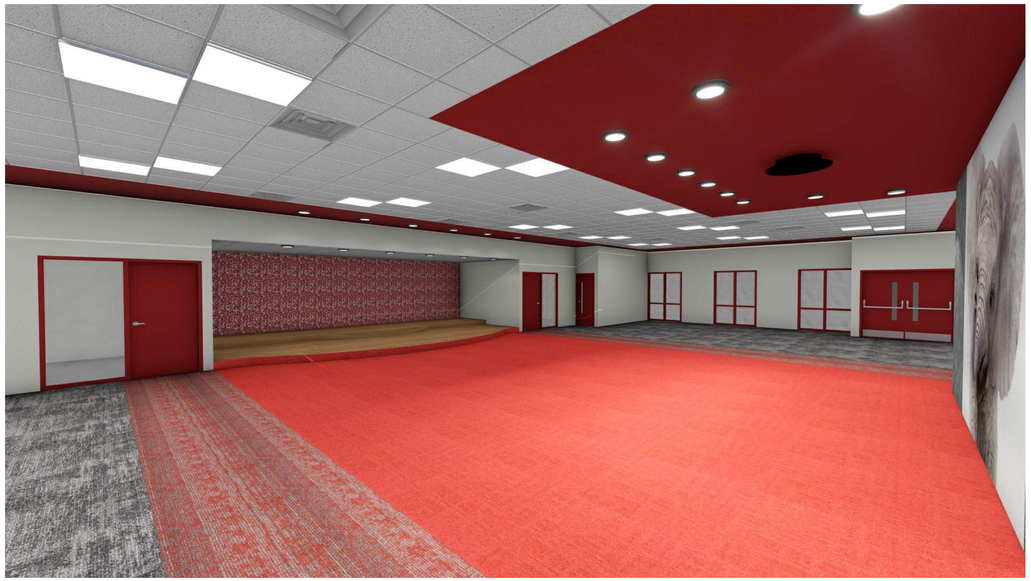
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2 ENLARGED MULTIMEDIA CENTER REFLECTED CEILING PLAN

SCALE: 1/8" = 1'-0"

PROJECT NORTH



CONSTRUCTION LEGEND

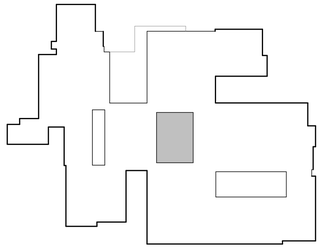
XX	INDICATES FINISH KEY NOTE. REFER TO KEY NOTE LEGEND BELOW FOR MORE INFORMATION.
	NEW CARPET (CPT) FLOORING AND WALL BASE IN THE AREA INDICATED
	NEW LUXURY VINYL TILE (LVT) FLOORING AND WALL BASE IN THE AREA INDICATED

CEILING LEGEND

	INDICATED AREA OF NEW CEILING GRID WITH NEW 2'x2' CEILING GRID AND PANEL SYSTEM	NO.	ROOM TAG
			EXISTING MECHANICAL SUPPLY TO REMAIN
	NEW SOFFIT CEILING		EXISTING MECHANICAL RETURN TO REMAIN
	EXISTING 2X4 LIGHTS TO REMAIN		EXISTING DOWNLIGHTS TO REMAIN
	EXISTING 2X2 LIGHTS TO REMAIN		

KEY NOTES LEGEND

1. PAINT ALL FRAMES AND DOORS. COLOR CHOICE BY ARCHITECT / DISTRICT
2. WALLPAPER TO BE INSTALLED BY CONTRACTOR. FINISH CHOICE BY ARCHITECT / DISTRICT
3. NEW CARPET TILE FLOORING - EGE - SHADOWPLAY - UMBRA
4. NEW CARPET TILE FLOORING - MOHAWK - 369 ROAN
5. NEW CARPET TILE FLOORING - BALSAN - KARMA - 550



KEY PLAN - LIBRARY

SCALE: 1" = 100'-0"

PROJECT NORTH

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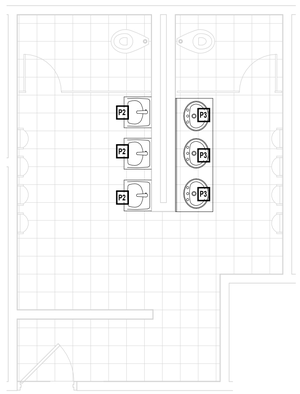
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ENLARGED MULTIMEDIA CENTER PLAN AND REFLECTED CEILING PLAN

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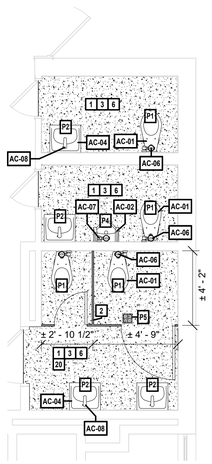
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1 MALE GANG RESTROOM - PROPOSED

SCALE: 1/4" = 1'-0"

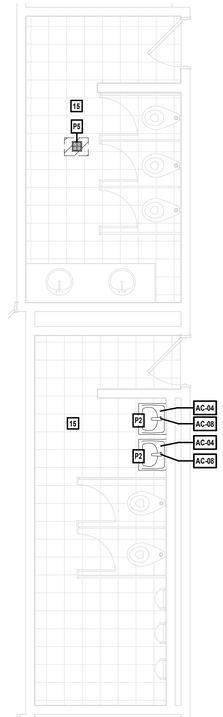
PROJECT NORTH



2 RESTROOMS - NURSE HALLWAY - PROPOSED

SCALE: 1/4" = 1'-0"

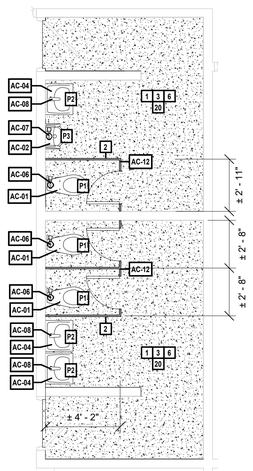
PROJECT NORTH



6 THIRD GRADE RESTROOMS - PROPOSED

SCALE: 1/4" = 1'-0"

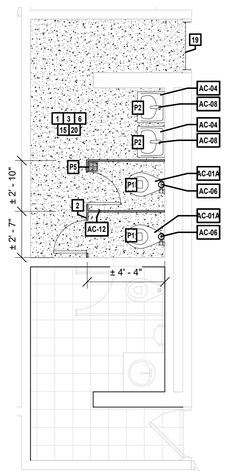
PROJECT NORTH



3 FOURTH GRADE RESTROOMS - PROPOSED

SCALE: 1/4" = 1'-0"

PROJECT NORTH



5 FIFTH GRADE RESTROOMS - PROPOSED

SCALE: 1/4" = 1'-0"

PROJECT NORTH

FIXTURE SCHEDULE					
FIXTURE NO.	NAME	BRAND	MODEL #	QUANTITY	ADA
AC-01	TOILET FLOOR MOUNTED (JUVENILE)	SLOAN	ST-2449	7	Yes
AC-01A	TOILET FLOOR MOUNTED	SLOAN VALVE	ST-2009	10	
AC-02	URINAL WALL HUNG	SLOAN VALVE	SU-1009	2	Yes
AC-03	DROP-IN LAVATORY	Sloan Valve	SS-3802	3	Yes
AC-04	LAVAOTRY SINGLE WALL HUNG	Sloan Valve	SS-3103	14	Yes
AC-06	FLUSHOMETER - TOILET	Sloan Valve	G2-8111	9	
AC-07	FLUSHOMETER - URINAL	Sloan Valve	G2-8186	2	
AC-08	FAUCET	Sloan Valve	EAF-150-BAT-CP-1.5GPM-AER-IR-IQ-FCT	14	
AC-12	TOILET PARTITION	SCRANTON PRODUCTS		7	

GENERAL CONSTRUCTION NOTES

1. TOILET ROOM DIMENSIONS ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS FOR QUANTITY TAKEOFFS AND FABRICATION OF MATERIALS.
2. VERIFY EXACT LAYOUT COMPATIBILITY WITH ALL EXISTING CONDITIONS BEFORE BEGINNING WORK.
3. PLUMBING CONTRACTOR SHALL ADJUST LOCATIONS OF WATER SUPPLIES AND WASTE AS REQUIRED FOR NEW FIXTURES.
4. ALL WORK SHALL BE IN COMPLIANCE WITH ALL FEDERAL AND NEW YORK STATE APPLICABLE BUILDING AND LIFE AND SAFETY REGULATIONS.
5. CONTRACTOR SHALL INSTALL WALL TILES SO THAT THEY ARE VERTICALLY PLUMB WITHIN 1/8" FROM THE FACE OF THE BASE TILE TO THE FACE OF THE UPPERMOST TILE.
6. REPAIR, RESTORE, AND REFINISH TO ORIGINAL APPEARANCE ALL WALL AND CEILING FINISHES THAT WERE DISTURBED IN THE COMPLETION OF THE WORK.
7. PROVIDE AND TURN OVER TO THE SCHOOL DISTRICT ALL EXTRA MAINTENANCE MATERIALS IN THE QUANTITIES INDICATED WITHIN THE SPECIFICATIONS.
8. PRIOR TO BEGINNING INSTALLING NEW CEILINGS, THE CONTRACTOR SHALL DETERMINE THE SET-OUT POINT AND REVIEW WITH THE ARCHITECT. THE INTENT IS TO HAVE FULL TILES CENTERED BETWEEN WALLS EACH DIRECTION. CUT TILES WILL ONLY BE USED ALONG THE PERIMETER OF THE NEW SPACE WITH A MINIMUM DIMENSION OF FOUR (4) INCHES IN ANY DIRECTION.
9. VERIFY LOCATION OF ALL ACCESSORIES PRIOR TO INSTALLATION WITH OWNER & ARCHITECT

CONSTRUCTION LEGEND

(NOT ALL MAY BE USED)

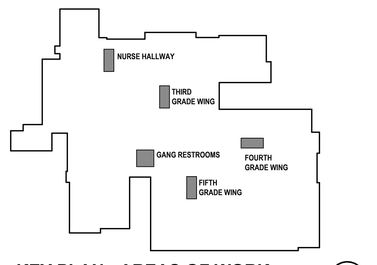
ROOM	INDICATES ROOM NAME FOR WORK IN CONTRACT		EXISTING DOOR TO REMAIN
11	KEYED CONSTRUCTION NOTE INDICATOR		NEW DOOR
#	INDICATES DOOR TAGS FOR WORK IN CONTRACT - CONTRACTOR SHALL FIELD VERIFY ALL DOOR SIZES		INDICATES FLOOR FINISH FOR WORK IN CONTRACT
#	INDICATES THRESHOLD TAGS FOR WORK IN CONTRACT		EXISTING WALL TO REMAIN

CONSTRUCTION NOTES - CONTRACT G

1	FLOOR FINISHES	PROVIDE NEW FLOOR FINISH AND WALL BASE. REFER FINISH SCHEDULE.
2	PARTITION SYSTEM	INSTALL NEW BATHROOM PARTITIONS.
3	WALL PAINT	PROVIDE NEW WALL PAINT. REFER ACCENT PAINT DETAIL FOR LAYOUT.
6	ACCESSORY FIXTURES	PROVIDE WALL MOUNTED ACCESSORY FIXTURES, WHICH INCLUDE TOILET TISSUE DISPENSER, SANITARY NAPKIN DISPOSAL, MIRROR.
15	ACT CEILING	PROVIDE NEW ACT CEILING TILES AND GRID SYSTEM AS NOTED. SAND, PRIME, AND PAINT ALL EXISTING SOFFITS. THE CONTRACTOR SHALL REINSTALL EXISTING EQUIPMENT INCLUDING, BUT NOT LIMITED TO ALL SPEAKERS, SMOKE DETECTORS, AND STROBES BACK TO THEIR ORIGINAL LOCATIONS.
19	MARBLE THRESHOLD	PROVIDE NEW MARBLE THRESHOLD.
20	WALL MOUNTED DEVICES	EXISTING ELECTRICAL DEVICES ON WALL TO REMAIN. PROTECT DURING APPLICATION OF NEW WALL PAINT, VERIFY LOCATION IN FIELD.

CONSTRUCTION NOTES - CONTRACT P

P1	FLOOR MOUNTED TOILET	PROVIDE NEW FLOOR MOUNTED JUVENILE HEIGHT TOILET WITH FLUSH SENSOR. INSTALL 1-INCH COLD WATER, 3-INCH SANITARY, AND 2-INCH VENT TO TOILET WITH WAX SEAL AND SEALANT.
P2	WALL HUNG SINK	PROVIDE NEW SINGLE LAVATORY WITH FAUCET AND SOAP DISPENSER. INSTALL 1/2-INCH COLD AND HOT WATER TO FAUCET WITH NEW STOP VALVES AND STAINLESS STEEL FLEXIBLE HOSES. INSTALL 1-1/2-INCH SANITARY AND VENT TO SINK. ADA INSTALLATIONS SHALL INCLUDE INSULATION AROUND THE DRAIN AND SUPPLY PIPING IN EXPOSED PIPING APPLICATIONS BELOW SINK. PROVIDE TEMPERATURE LIMITING DEVICE FOR ON THE HOT WATER LINE TO ALL HAND SINKS AND SET AT 105 DEGREE F. PROVIDE SUPPORT CARRIER AND MOUNT AS PER THE SPECIFICATIONS.
P3	DROP-IN VANITY SINK	PROVIDE NEW SINGLE DROP-IN VANITY LAVATORY WITH FAUCET AND SOAP DISPENSER. INSTALL 1/2-INCH COLD AND HOT WATER TO FAUCET WITH NEW STOP VALVES AND STAINLESS STEEL FLEXIBLE HOSES. INSTALL 1-1/2-INCH SANITARY AND VENT TO SINK. ADA INSTALLATIONS SHALL INCLUDE INSULATION AROUND THE DRAIN AND SUPPLY PIPING IN EXPOSED PIPING APPLICATIONS BELOW SINK. PROVIDE TEMPERATURE LIMITING DEVICE FOR ON THE HOT WATER LINE TO ALL HAND SINKS AND SET AT 105 DEGREE F. PROVIDE SUPPORT CARRIER AND MOUNT AS PER THE SPECIFICATIONS.
P4	WALL MOUNTED URINAL	PROVIDE NEW WALL MOUNTED URINAL. INSTALL 3/4-INCH COLD WATER, 1-1/2-INCH SANITARY AND 1-1/2-INCH VENT TO URINAL. FOR WALL MOUNTED FIXTURE, PROVIDE SUPPORT CARRIER AND MOUNT AS PER THE SPECIFICATIONS.
P5	FLOOR DRAIN	PROVIDE AND INSTALL NEW FLOOR DRAIN COVER PLATE AND TRAP SEAL, ZURN MODEL Z1072.



KEY PLAN - AREAS OF WORK

SCALE: 1" = 100'-0"

PROJECT NORTH

H2M architects + engineers

1133 Westchester Avenue, Suite N-210
White Plains, NY 10605
914.358.5623 • www.h2m.com
NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

09/30/2026
KATRINA N. PACHECO, R.A.
NY PROFESSIONAL ARCHITECT Lic. No.: 041183
Exp. Date

"IN ACCORDANCE WITH ARTICLE 145, SECTION 7209 OF THE NYS EDUCATION LAW, ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL."

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
M. LUCK	M. LUCK	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-XXX

CONTRACT

CONTRACT G & P
GENERAL AND PLUMBING CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

RESTROOM UPGRADES PROPOSED PLANS

DRAWING No.

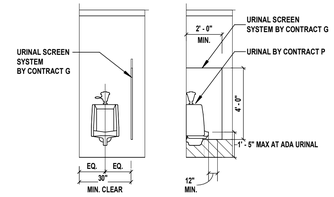
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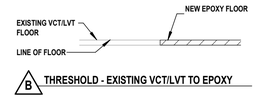
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FINISH SCHEDULE

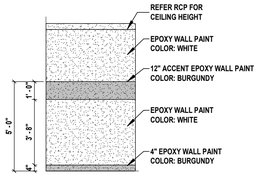
Number	NAME	FLOORING		NORTH WALL		EAST WALL		SOUTH WALL		WEST WALL		CEILING		COMMENTS
		FINISH	BASE	MAT.	FIN.	MAT.	FIN.	MAT.	FIN.	MAT.	FIN.	HT	MAT.	
140	BOYS' RESTROOM	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST		EXIST	
131	BOYS RESTROOM	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	8' - 1"	ACT	REFER TO REFLECTED CEILING PLAN FOR CEILING REPLACEMENT SCOPE.
132	GIRLS RESTROOM	EFP	EWP	EWP	EXIST	EWP	EXIST	EWP	EXIST	EWP	EXIST	8' - 4"	ACT	REFER TO REFLECTED CEILING PLAN FOR CEILING REPLACEMENT SCOPE.
114	GIRLS RESTROOM	EFP	EWP	EWP	EXIST	EWP	EXIST	EWP	EXIST	EWP	EXIST		EXIST	
115	ALL-GENDER RESTROOM	EFP	EWP	EWP	EXIST	EWP	EXIST	EWP	EXIST	EWP	EXIST		EXIST	
116	ALL-GENDER RESTROOM	EFP	EWP	EWP	EXIST	EWP	EXIST	EWP	EXIST	EWP	EXIST		EXIST	
125A	BOYS RESTROOM	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	8' - 4"	ACT	
137	BOYS RESTROOM	EFP	EWP	EWP	EXIST	EWP	EXIST	EWP	EXIST	EWP	EXIST		EXIST	
138	GIRLS RESTROOM	EFP	EWP	EWP	EXIST	EWP	EXIST	EWP	EXIST	EWP	EXIST		EXIST	
125	GIRLS RESTROOM	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	EXIST	8' - 4"	ACT	



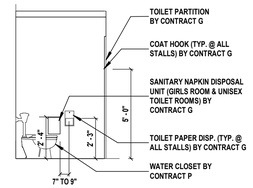
1 URINAL - ACCESSIBLE
SCALE: 1/4" = 1'-0"



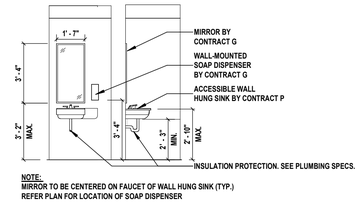
2 DOOR THRESHOLDS - INTERIOR
SCALE: 3" = 1'-0"



3 TILE ACCENT WALL
SCALE: 1/4" = 1'-0"



4 TOILET - TYPICAL
SCALE: 1/4" = 1'-0"



NOTE:
MIRROR TO BE CENTERED ON FAUCET OF WALL HUNG SINK (TYP.)
REFER PLAN FOR LOCATION OF SOAP DISPENSER

5 WALL HUNG SINK
SCALE: 1/4" = 1'-0"

PLUMBING FIXTURE SCHEDULE

FIXTURE TAG	DESCRIPTION	MAX FLOW	MINIMUM CONNECTION SIZES							SPECIFICATION	REMARKS
			COLD WATER		HOT WATER		DRAIN		VENT		
		MAX FLOW	SIZE	WFU	SIZE	WFU	SIZE	DFU			
AC-04	LAVATORY - WALL MOUNT - ADA COMPLIANT - CENTER HOLE - SENSOR FAUCET	0.5 GPM	1/2"	0.5	1/2"	0.5	1-1/2"	1	1-1/2"	SINK: VITREOUS CHINA DROP-IN, SELF-RIMMING, SINGLE HOLE., ASME A112.19.2, FRONT OVERFLOW. FAUCET: DECK MOUNTED, ADA COMPLIANT, INTEGRATED SIDE MIXER, VANDAL RESISTANT, CHROME, GRID STRAINER WITH 0.5 GPM AERATOR. COMPLIES WITH ASME A112.18.1 AND NSF 372.	PROVIDE BRASS ANGLE STOP VALVES WITH FLEXIBLE STAINLESS STEEL SUPPLIES, AND 1-1/2" BRASS P-TRAP. PROVIDE CARRIER SUPPORT WATTS WCA-411 OR APPROVED EQUAL. HOT WATER SHALL NOT EXCEED 105°F. INSULATE ALL EXPOSED DRAIN AND SUPPLY PIPING WITH TRUBRO LAVGUARD FOR HC FIXTURES.
AC-01	WATER CLOSET - FLOOR MOUNTED - ADA COMPLIANT - TOP SPUD- JUVENILE	1.28 GPF	1"	10	- - -	- - -	3"	4	1-1/2"	TOILET: VITREOUS CHINA, ADA HEIGHT, JUVENILE HEIGHT, ASME A112.19.2. PROVIDE TOILET SEAT CHURCH 295CT OR APPROVED EQUAL. MINIMUM OF 25 PSI. FLUSH VALVE: EXPOSED SENSOR FLUSHOMETER, POLISHED CHROME, ADA COMPLIANT, VANDAL RESISTANT. COMPLIES WITH ASSE 1037. PROVIDE REQUIRED BATTERIES AND NO PIPE SEALANT ALLOWED.	COORDINATE GRAB BAR HEIGHT WITH FLUSH VALVE.
AC-02	URINAL - WALL MOUNTED - ADA COMPLIANT - TOP SPUD	0.125 GPF	3/4"	5	- - -	- - -	2"	4	1-1/2"	URINAL: VITREOUS CHINA, ADA HEIGHT, WALL MOUNTED, ASME A112.19.2. FLUSH VALVE: EXPOSED SENSOR FLUSHOMETER, POLISHED CHROME, ADA COMPLIANT, VANDAL RESISTANT. COMPLIES WITH ASSE 1037. PROVIDE REQUIRED BATTERIES AND NO PIPE SEALANT ALLOWED.	PROVIDE CARRIER SUPPORT WATTS CA-311 OR APPROVED EQUAL.
AC-01A	WATER CLOSET - FLOOR MOUNTED - ADA COMPLIANT - TOP SPUD	1.28 GPF	1"	10	- - -	- - -	3"	4	1-1/2"	FLUSH VALVE: EXPOSED SENSOR FLUSHOMETER, POLISHED CHROME, ADA COMPLIANT, VANDAL RESISTANT. COMPLIES WITH ASSE 1037. PROVIDE REQUIRED BATTERIES AND NO PIPE SEALANT ALLOWED.	COORDINATE GRAB BAR HEIGHT WITH FLUSH VALVE.

DOOR TYPE NOTES

1. FRAMES AND DOORS SCHEDULED FOR EXISTING OPENING - VERIFY IN FIELD EXISTING OPENING SIZES AND RECORD ON SHOP DRAWINGS.
2. ALL DOORS ARE TO BE ADJUSTED TO ELIMINATE RATTLE AND OR PLAY WHEN DOOR IS LATCHED
3. SLOPED ALUMINUM THRESHOLDS AT ALL EXTERIOR DOORS
4. ALL DOORS ARE TO HAVE STOPS
5. UNDERCUT DOORS WHERE MARBLE THRESHOLDS ARE CALLED OUT INSTALL KICKPLATES ON PUSH SIDE OF DOOR (TYP).
6. FIRE RATED DOORS AND FRAMES REQUIRE LABELS
7. BACKER ROD AND SEALANT SHALL BE PROVIDED AT ALL LOCATIONS WHERE DOOR/WINDOW FRAMES MEET OTHER FINISHES
8. ALL GLAZING IN DOORS, FIXED SIDE PANELS ADJOINING DOORS, INTERIOR PARTITIONS WHERE GLAZING EXTENDS TO WITHIN 1'-6" OF FINISHED FLOOR AND GLASS PANELS GREATER THAN 50 SF TO BE FULLY TEMPERED SAFETY GLASS PER CHAPTER 24 OF THE 2020 BCNYS.

FINISH ABBREVIATIONS

ACT	ACOUSTICAL CEILING TILE	RUBBER	RUBBER FLOORING
CG	CORNER GUARD	P.T./PT	PAINT
C.M.U.	CONCRETE MASONRY UNIT	S.A.C./SAC	SUSPENDED ACOUSTICAL CEILING
CONC.	CONCRETE	STRUCT.	STRUCTURE
C.F.T./CFT	CERAMIC FLOOR TILE	V.C.T./VCT	VINYL COMPOSITE TILE
C.W.T./CWT	CERAMIC WALL TILE	EXIST.	EXISTING
D.F.	DRINKING FOUNTAIN	EXT	EXTERIOR
E.W.P.	EPOXY WALL PAINT	HM	HOLLOW METAL
EFP	EPOXY FLOOR PAINT	U.S.	UNDERSIDE
EXP.	EXPOSED		
G.W.B./GWB	GYPSUM WALL BOARD		
L.V.T./LVT	LUXURY VINYL TILE		

DOOR FRAME DEPTH NOTES

WALL TYPE	FRAME SIZE
INTERIOR 6" CMU WALL	4 - 5/8"

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CONSULTANTS:

MARK	DATE	DESCRIPTION

REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

Katrina N. Pacheco 09/30/2029
KATRINA N. PACHECO, R.A. — Exp. Date
NY PROFESSIONAL ARCHITECT LIC. No. 041183

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
M. LUCK	M. LUCK	S. MANDIC	K. PACRECO

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT
SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-XXX

CONTRACT
CONTRACT G
GENERAL CONSTRUCTION

STATUS
SED SUBMISSION

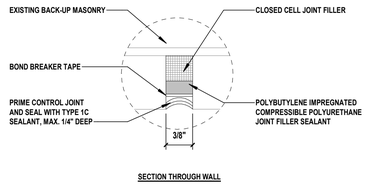
SHEET TITLE
RESTROOM UPGRADES DETAILS AND SCHEDULES

DRAWING No.
SI-A 431.00

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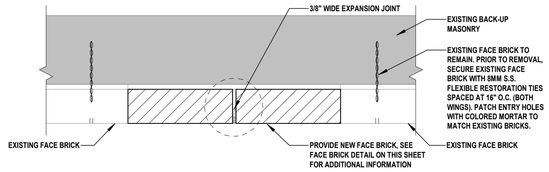


1 MASONRY POINTING
SCALE: 1 1/2" = 1'-0"

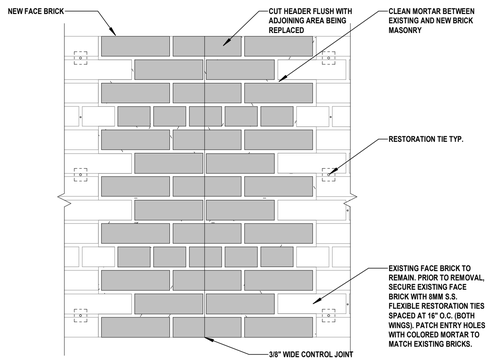


SECTION THROUGH WALL

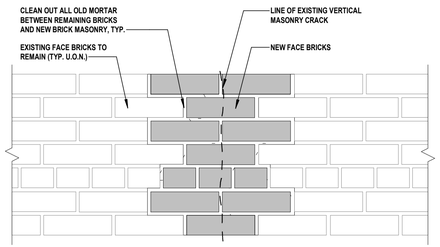
2 EXTERIOR MASONRY WALL - CONTROL JOINT-SECTION
SCALE: 12" = 1'-0"



3 EXTERIOR MASONRY WALL - EXPANSION JOINT-PLAN
SCALE: 1 1/2" = 1'-0"

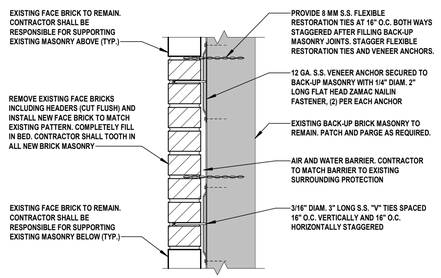


4 EXTERIOR MASONRY WALL - NEW BRICK ELEVATION
SCALE: 1 1/2" = 1'-0"



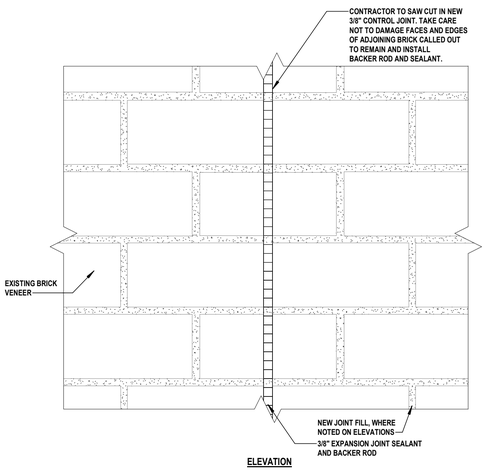
NOTES:
1. REPLACE HATCHED BRICKS/BLOCKS WITH NEW BRICKS/BLOCKS.
2. DO NOT REPLACE HEADER BRICKS IF NOT CRACKED.
3. ALL JOINTS BETWEEN BRICK HEAD AND BED JOINTS ARE TO BE FILLED SOLID.

5 MASONRY STITCH REPAIR
SCALE: 1 1/2" = 1'-0"



NOTE: REPLACE EXISTING MASONRY THROUGH-WALL AND COUNTER FLASHING WITH NEW WHERE INDICATED ON ELEVATIONS.

6 BLOCK REPLACEMENT - FACE BRICK/ SPLIT FACE
SCALE: 1 1/2" = 1'-0"



ELEVATION

7 NEW EXPANSION JOINT - ELEVATION
SCALE: 3" = 1'-0"

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CONSULTANTS:

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REGISTERED ARCHITECT KATRINA PACHECO 041183 STATE OF NEW YORK

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KATRINA N. PACHECO, R.A. Exp. Date
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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
S. MANDIC	C. HENRY	S. MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2505	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

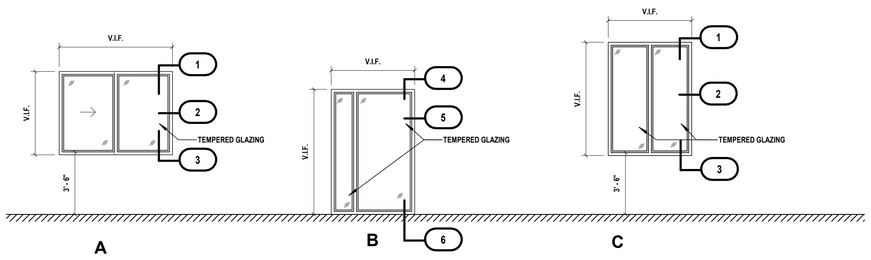
SED SUBMISSION

SHEET TITLE

ARCHITECTURAL DETAILS

DRAWING No.

SI-A 500.00



Window Types

SCALE: 1/4" = 1'-0"

WINDOW SCHEDULE

MARK	FRAME MATERIAL	FRAME FINISH	DETAILS HEAD	DETAILS JAMB	DETAILS SILL	Comments
A	EXIST.	PT	1/SI-A 610	2/SI-A 610	3/SI-A 610	EXISTING WIRE GLASS TO BE REPLACED WITH FIRE RATED GLAZING
B	ALUM.	PT	4/SI-A 610	5/SI-A 610	6/SI-A 610	EXISTING WIRE GLASS TO BE REPLACED WITH FIRE RATED GLAZING
C	EXIST.	PT	1/SI-A 610	2/SI-A 610	3/SI-A 610	EXISTING WIRE GLASS TO BE REPLACED WITH FIRE RATED GLAZING

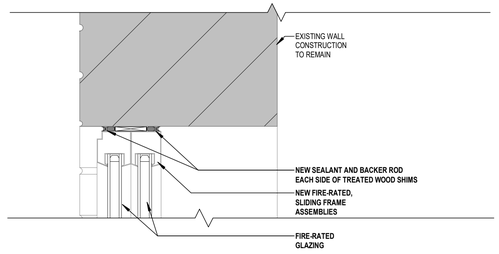
NOTES:

1. REFER TO WINDOW SCHEDULE, HARDWARE SETS, AND PROJECT MANUAL FOR HARDWARE INFORMATION.
2. ALL REQUIRED PREP AND MODIFICATIONS TO EXISTING WALL ASSEMBLIES TO ACCOMMODATE NEW WINDOWS SHALL BE INCLUDED IN BID PRICE.
3. CONTRACTOR TO VERIFY ALL EXISTING OPENING SIZES, CONDITIONS AND SWINGS PRIOR TO ORDERING ANY MATERIAL, SHOULD ANY CONFLICTS ARISE, ARCHITECT SHALL BE NOTIFIED IMMEDIATELY.
4. WINDOW FRAMES TO RECEIVE PAINTED FINISH, COLOR TO MATCH EXISTING COLOR.

FINISH ABBREVIATIONS :

ALUM = ALUMINUM
PT = PAINT

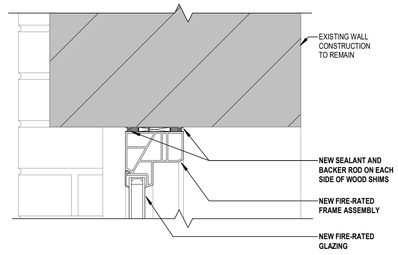
EXTERIOR INTERIOR



1 WINDOW HEAD CMU - MASONRY VENEER

SCALE: 3" = 1'-0"

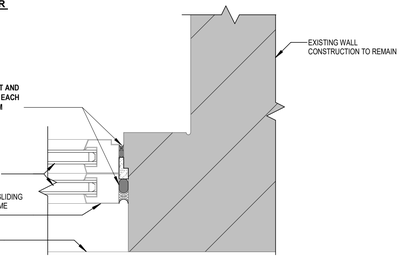
EXTERIOR INTERIOR



4 WINDOW HEAD CMU - MASONRY VENEER

SCALE: 3" = 1'-0"

EXTERIOR

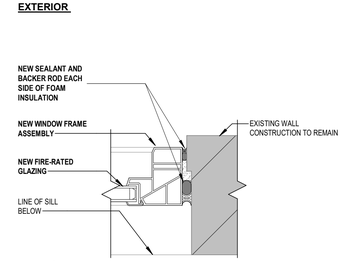


INTERIOR

2 WINDOW JAMB CMU - MASONRY VENEER

SCALE: 3" = 1'-0"

EXTERIOR

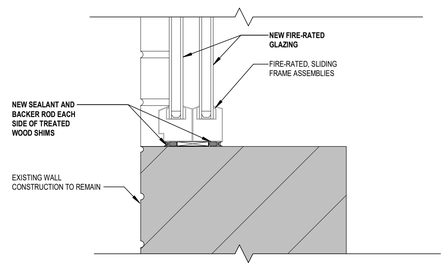


INTERIOR

5 WINDOW JAMB CMU - MASONRY VENEER

SCALE: 3" = 1'-0"

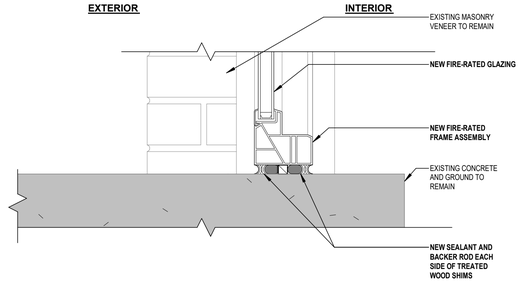
EXTERIOR INTERIOR



3 WINDOW SILL CMU - MASONRY VENEER

SCALE: 3" = 1'-0"

EXTERIOR INTERIOR



6 WINDOW SILL - MASONRY VENEER

SCALE: 3" = 1'-0"

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09/30/2029
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KATRINA N. PACHECO, R.A.
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L. RAUSCHER	L. RAUSCHER	S.MANDIC	K. PACHECO

PROJECT No:	DATE:	SCALE:
SMSD2505	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT G
GENERAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

WINDOW SCHEDULE AND DETAILS

DRAWING No.

SI-A 610.00

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ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
BCU	BUILDING CONTROL UNIT
BTU	BRITISH THERMAL UNIT
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CLG	CEILING
COMM.	COMMUNICATION
CV	CONTROL VALVE
(D)	DEMOLISH
DB	DRY BULB
DCV	DEMAND CONTROLLED VENTILATION
DEG. F	DEGREES FAHRENHEIT
DIA	DIAMETER
DX	DIRECT EXPANSION
'E'	ELECTRICAL CONTRACTOR
(E)	EXISTING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EER	ENERGY EFFICIENCY RATING
ESP	EXTERNAL STATIC PRESSURE
FAI	FRESH AIR INTAKE
FD	FLOOR DRAIN
FLA	FULL LOAD AMPS
FT. H20	FEET OF WATER
'G'	GENERAL CONSTRUCTION CONTRACTOR
GPM	GALLONS PER MINUTE
GPH	GALLONS PER HOUR
H	HEIGHT
'H'	HVAC CONTRACTOR
HP	HORSEPOWER
IN.	INCHES
IN. W.C. (W.G.)	INCHES WATER COLUMN (WATER GAUGE)
KW	KILOWATTS
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LCD	LIQUID CRYSTAL DISPLAY
LDB	LEAVING DRY BULB TEMPERATURE
LWB	LEAVING WET BULB TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
M	METER
MAX	MAXIMUM
MBH	1,000 BTU PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MIN	MINIMUM
MNF	MANUFACTURER
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
OAI	OUTDOOR AIR INTAKE
OD	OUTER DIAMETER
OED	OPEN ENDED DUCT
'P'	PLUMBING CONTRACTOR
PD	PRESSURE DROP
PSIG	LBS / SQUARE INCH (GAUGE PRESSURE)
RD	ROOF DRAIN
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE
SAT	SUPPLY AIR TEMPERATURE
SEER	SEASONAL ENERGY EFFICIENCY RATING
TEMP	TEMPERATURE
TG	TRANSFER GRILLE
TYP	TYPICAL
VFD	VARIABLE FREQUENCY DRIVE
W	WIDTH
WB	WET BULB
WMS	WIRE MESH SCREEN

DUCTWORK LEGEND

SYMBOL	ABBREV	DESCRIPTION
		NEW DUCTWORK WITH 45 DEGREE TAKE OFF
	VD	VOLUME DAMPER
	CD	ROUND SUPPLY CEILING DIFFUSER
	SEE AIR DEVICE SCHEDULE	SIDEWALL SUPPLY, RETURN OR EXHAUST
	SEE AIR DEVICE SCHEDULE	SQUARE SUPPLY CEILING DIFFUSER
	SEE AIR DEVICE SCHEDULE	CEILING RETURN OR EXHAUST GRILLE
		FLEX DUCT
	FC	FLEXIBLE CONNECTION
		TURNING VANES
		RECTANGULAR TO ROUND TRANSITION
	AL	ACOUSTICAL LINING
		END CAP
	SEE AIR DEVICE SCHEDULE	SUPPLY DIFFUSER WITH DIRECTIONAL FLOW (SOLID HATCH INDICATES BLANK OFF PANEL)
		SUPPLY DUCT DROP
		RETURN/EXHAUST DUCT DROP
		SUPPLY DUCT RISE
		RETURN/EXHAUST DUCT RISE
DSD	DSD	DUCT SMOKE DETECTOR
M	MD	MOTORIZED DAMPER WITH ACTUATOR
OR	AD	ACCESS DOOR
	FD/AD	FIRE DAMPER WITH ACCESS DOOR
	FD/AD	FIRE DAMPER AT FLOOR PENETRATION WITH ACCESS DOOR
	FSD/AD	FIRE SMOKE DAMPER WITH ACCESS DOOR
		WORK TO BE REMOVED
		POINT OF DISCONNECTION FROM EXISTING
		POINT OF RECONNECTION TO EXISTING

PIPING LEGEND

SYMBOL	ABBREV	DESCRIPTION
		NEW WORK
		WORK TO BE REMOVED
		PIPING DOWN/ PIPING UP
		BALL VALVE WITH HOSE END CONNECTION
	TH	THERMOMETER
	U	UNION
	FPC	FLEXIBLE PIPE CONNECTION/ FLEX PIPE
		DIRECTION OF FLOW
	PSR	PRESSURE SAFETY AND RELIEF VALVE
	PRV	PRESSURE REDUCING VALVE
	BV	BALL VALVE
	BA	BALANCING VALVE
	BFV	BUTTERFLY VALVE
		TEMPERATURE SENSOR WITH THERMOWELL
	GA	GATE VALVE
	GB	GLOBE VALVE
	AV	AUTOMATIC AIR VENT
	CV	2-WAY ELECTRONIC CONTROL VALVE
	CV	3-WAY ELECTRONIC CONTROL VALVE
	CV	2-WAY PNEUMATIC CONTROL VALVE
	CV	3-WAY PNEUMATIC CONTROL VALVE
		PLUG VALVE
	STR	STRAINER
	STR	STRAINER WITH BLOW OFF VALVE WITH HOSE END CONNECTION
	FD	FLOOR DRAIN
S		AIR SEPARATOR
F&T		STEAM TRAPS (INDICATE TYPE)
	CH	CHECK VALVE
	PG	PRESSURE GAUGE WITH GAUGE COCK
	RED	REDUCER
CO.	CO	CLEANOUT END CAP
		PIPE GUIDE
		PIPE ANCHOR
		CAPPED PIPE
		PUMP
		POINT OF DISCONNECTION FROM EXISTING
		POINT OF RECONNECTION TO EXISTING
	TDV	TRIPLE DUTY VALVE

CONTROLS LEGEND

SYMBOL	DESCRIPTION
C	CARBON MONOXIDE SENSOR
T	THERMOSTAT
S	DIGITAL TEMPERATURE SENSOR
H	HUMIDITY SENSOR
P	PRESSURE SENSOR
C2	CARBON DIOXIDE SENSOR

GENERAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
2. THE CONTRACTOR, BY PRESENTING THEIR BID FOR THE WORK, REPRESENTS THAT HE/SHE HAS INSPECTED THE SITE AND IS COMPLETELY FAMILIAR WITH THE SCOPE OF WORK AND ALL FIELD CONDITIONS RELATED TO, AND AFFECTING THE WORK AND ITS PERFORMANCE. EXCEPTIONS AFFECTING THE WORK AND ITS PERFORMANCE, OR CONFLICTS BETWEEN FIELD CONDITIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT PRIOR TO THE SUBMISSION OF BIDS.
3. PERFORM ALL WORK IN ACCORDANCE WITH THE PLUMBING CODE, FIRE CODE, MECHANICAL CODE, ENERGY CONSERVATION CODE, AND FUEL GAS CODE OF NEW YORK STATE AND REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION.
4. COMPLY WITH THE NATIONAL ELECTRIC CODE AND THE REQUIREMENTS OF DIVISION 26 FOR ALL ELECTRICAL INSTALLATIONS.
5. FIRE STOP ALL OPENINGS IN FIRE RATED CONSTRUCTION FOR PIPING, DUCTWORK, CONDUIT, ETC. PROVIDE FIRE DAMPERS AND ACCESS DOORS IN ALL OPENINGS IN FIRE RATED FLOORS, PARTITIONS, AND WALLS FOR DUCTWORK AS PER THE MECHANICAL CODE OF NEW YORK STATE. (SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF FIRE RATED CONSTRUCTION.)
6. DO NOT SCALE DRAWINGS. DRAWINGS FOR HVAC WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE. COORDINATE CONTRACT DOCUMENTS, PROJECT REQUIREMENTS, WORK OF OTHERS, AND EQUIPMENT AND MATERIALS PURCHASED WITH FIELD DIMENSIONS. INSTALL ALL EQUIPMENT AS PER MANUFACTURER'S REQUIREMENTS TO PROVIDE PROPER CLEARANCE FOR INSTALLATION, OPERATION, AND MAINTENANCE. CONTRACTOR'S INTENDED MEANS AND METHODS OF INSTALLATION AND CONTRACTOR'S FABRICATED ITEMS SHALL ENSURE A PROPER "FIT" AND INSTALLATION. BRING ANY CONFLICTS TO THE ATTENTION OF THE ARCHITECT/ENGINEER DURING THE SUBMITTAL PHASE FOR RESOLUTION PRIOR TO PURCHASING ANY EQUIPMENT.
7. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS AT ALL POINTS. WHERE HEADROOM AND SPACE CONDITIONS APPEAR INADEQUATE, NOTIFY THE ARCHITECT/ENGINEER PRIOR TO PROCEEDING WITH INSTALLATION. MAINTAIN A MINIMUM OF 6'-8" CLEARANCE FROM FINISHED FLOOR TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS OR WALKING AREAS.
8. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION. MAKE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK. OBTAIN THE APPROVAL OF THE ARCHITECT/ENGINEER FOR MODIFICATIONS.
9. PROVIDE PRODUCTS OF ONE MANUFACTURER WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF MATERIAL OR EQUIPMENT IS REQUIRED.
10. INSTALL ALL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS. REFER TO DETAILS FOR ADDITIONAL PIPING AND EQUIPMENT INSTALLATION REQUIREMENTS.
11. LOCATE ALL TEMPERATURE, PRESSURE, AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH STRAIGHT SECTION OF PIPE OR DUCT UP- AND DOWNSTREAM AS RECOMMENDED BY THE MANUFACTURER TO ENSURE MANUFACTURER CERTIFIED ACCURACY.
12. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL PIPING AND DUCT TRANSITIONS REQUIRED FOR FINAL CONNECTIONS TO EQUIPMENT.
13. COORDINATE LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS WITH ALL OTHER TRADES. COORDINATE ALL PIPING AND EQUIPMENT SUPPORTED FROM STRUCTURE WITH GENERAL CONSTRUCTION WORK.
14. COORDINATE INSTALLATION OF SUPPLY AND RETURN GRILLES WITH INSTALLATION OF FINISHED CEILINGS.
15. COMPLETE ALL PRESSURE TESTS BEFORE ANY MECHANICAL EQUIPMENT, DUCTWORK, OR PIPING INSULATION IS APPLIED.
16. TESTING, ADJUSTING, AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). PERFORM ALL TESTING, ADJUSTING, AND BALANCING IN ACCORDANCE WITH THE SPECIFICATIONS.
17. MAKE ALL ATTACHMENTS TO JOISTS, TRUSSES, OR JOIST GIRDERS AT PANEL POINTS. PROVIDE FORGED OR CAST BEAM CLAMPS; THE USE OF ROLLED STEEL C-CLAMPS IS NOT PERMITTED. REFER TO SPECIFICATION SECTION 230529 FOR ADDITIONAL INFORMATION.
18. PROVIDE CONCRETE PADS A MINIMUM OF 6 INCHES HIGH FOR ALL FLOOR MOUNTED EQUIPMENT. EXTEND PAD 4 INCHES BEYOND THE EQUIPMENT ON ALL SIDES.
19. INTERNALLY LINE ALL SUPPLY, RETURN AND OUTDOOR AIR DUCTWORK WITHIN 20 FEET UPSTREAM AND DOWNSTREAM OF FANS/AIR HANDLING EQUIPMENT WITH 1" THICK ACOUSTIC DUCT LINER. INTERNALLY LINED DUCTWORK MEETING THIS REQUIREMENT SHALL ALSO BE PROVIDED WITH EXTERNALLY APPLIED INSULATION AS REQUIRED BY THE SPECIFICATIONS. SEE SPECIFICATION SECTION 230719 FOR ADDITIONAL REQUIREMENTS.
20. PROVIDE TRAPPED DRAIN PIPING FROM DRAIN PANS OF ALL COOLING COILS, FANS, AND OTHER ACTIVE DRAINS EXPOSED TO SYSTEM AIR STREAM. PROVIDE TRAP AT CONNECTION, WATER SEAL DEPTH 1 INCH GREATER THAN UNIT OPERATING PRESSURE. DIRECT DRAINS TO NEAREST FLOOR DRAIN, MOP SINK, OR OTHER LOCATION APPROVED BY ARCHITECT/ENGINEER.
21. INSTALL PIPING, DUCTWORK, AND CONDUIT CONCEALED IN AREAS HAVING HUNG CEILINGS AND/OR FURRED SPACES UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

WORK IN EXISTING AREAS

1. EXISTING CONDITIONS, INCLUDING EQUIPMENT, DUCT AND PIPE SIZES AND LOCATIONS, INDICATED ON THE DRAWINGS ARE DIAGRAMMATIC. CONFIRM ALL EXISTING CONDITIONS PRIOR TO PROCEEDING WITH THE WORK.
2. CUT AND ROUGH PATCH EXISTING CONSTRUCTION AS REQUIRED FOR THE PERFORMANCE OF THE WORK. FINISH PATCHING AND FLASHING REQUIREMENTS ARE SHOWN ON THE ARCHITECTURAL DRAWINGS. PERFORM ALL CUTTING AND PATCHING WORK IN A MANNER SUCH THAT EXISTING WARRANTEES/GUARANTEES ARE NOT VOIDED, USE QUALIFIED PERSONNEL IN PERFORMANCE OF WORK.

CONTRACT 'M' SCOPE NOTES

1. FURNISH AND INSTALL ALL NECESSARY CONTROL WIRING, CONDUIT, AND ACCESSORIES AS REQUIRED TO PROVIDE FULLY FUNCTIONING SYSTEMS AND SEQUENCES OF OPERATION.
2. FURNISH ALL CURBS FOR ALL ROOF MOUNTED EQUIPMENT AND DUCT PENETRATIONS FOR INSTALLATION BY CONTRACT 'G'.
3. REMOVE CHASE ENCLOSURE COVER WHEN PERFORMING WORK IN ANY CHASE, AND REINSTALL THE CHASE ENCLOSURE COVER WHEN WORK IS COMPLETE.
4. PERFORM ALL CUTTING AND PATCHING AS REQUIRED IN THE EXECUTION OF THE WORK. FINISH PATCHING AND FLASHING IS PART OF CONTRACT 'G'

LEGENDS/ABBREVIATIONS NOTES

1. ABBREVIATIONS AND SYMBOLS ON THIS SHEET DO NOT DEFINE THE SCOPE OF WORK.

EXISTING SYSTEM PRE-MODIFICATION/DEMOLITION TESTING

1. OBTAIN THE SERVICES OF A TESTING AND BALANCING COMPANY TO PERFORM OPERATIONAL TESTS PRIOR TO THE MODIFICATION / DEMOLITION OF THE EXISTING AIR SYSTEM(S). SUBMIT REPORT TO ENGINEER FOR REVIEW/RECORD PURPOSES WITH FINDINGS INCLUDING, BUT NOT LIMITED TO, EXISTING FAN CURVES, PRESSURE READINGS, AIRFLOW MEASUREMENTS, ENTERING AIR TEMPERATURE, LEAVING AIR TEMPERATURE, EQUIPMENT/MOTOR NAMEPLATE DATA, ETC.
2. VERIFY EXISTING EQUIPMENT CALLED TO BE REPLACED 'IN-KIND' IS OPERATIONAL (HAS POWER AND RESPONDS TO EXISTING CONTROLS) PRIOR TO PERFORMING ANY DISCONNECTIONS OR REMOVALS. REPORT ANY DEFICIENCIES IN EXISTING SERVICES OR CONTROLS EXPECTED TO BE RE-USED FOR THE 'IN-KIND' REPLACEMENT TO ENGINEER IN WRITING PRIOR TO REMOVALS. CONTRACTOR IS RESPONSIBLE TO CORRECT ANY DEFICIENCIES NOT REPORTED PRIOR TO DEMOLITION TO PROVIDE A FULLY OPERATIONAL EQUIPMENT REPLACEMENT.

SYSTEM COMMISSIONING NOTES (NYS)

1. COMMISSION ALL NEW BUILDING MECHANICAL SYSTEMS IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2025 NEW YORK STATE (NYS) ENERGY CONSERVATION CONSTRUCTION CODE (ECCC) SECTION C408. COMMISSIONING SHALL BE PERFORMED BY AN APPROVED THIRD-PARTY COMMISSIONING AGENCY HIRED BY THE ASSIGNED CONSTRUCTION MANAGER / CONTRACTOR. REFER TO SPECIFICATION SECTIONS 019113 - GENERAL COMMISSIONING REQUIREMENTS AND 230800 - COMMISSIONING OF MECHANICAL SYSTEMS FOR MORE INFORMATION.
2. PROVIDE DRAWINGS, OPERATION & MAINTENANCE (O&M) MANUALS, AND SYSTEM BALANCING REPORTS TO BUILDING OWNER OR OWNER'S AUTHORIZED AGENT WITHIN 90 DAYS OF THE DATE OF RECEIPT OF THE CERTIFICATE OF OCCUPANCY OR LETTER OF COMPLETION IN ACCORDANCE WITH THE 2025 NYS ECCC SECTION C408.2.5.
3. COMMISSIONING AGENT SHALL PROVIDE FINAL COMMISSIONING REPORT TO THE BUILDING OWNER OR OWNER'S AUTHORIZED AGENT WITHIN 90 DAYS OF THE RECEIPT OF THE CERTIFICATE OF OCCUPANCY OR LETTER OF COMPLETION IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2025 NYS ECCC SECTION C408.2.5.4.

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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · JOHN C. MORRIS III · LICENSED PROFESSIONAL ENGINEER · 057554-1

05/31/2028
Exp. Date

J. CHRIS MORRIS III, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 057554

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W. MAGIERA	W. MAGIERA	K. WEILER	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

MECHANICAL
GENERAL NOTES, LEGENDS, AND ABBREVIATIONS

DRAWING No.

SI-M 001.00

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GENERAL NOTES

1. THE EXISTING CONDITIONS SHOWN ON THE CONTRACT DRAWINGS ARE BASED ON LIMITED FIELD SURVEY AND EXISTING DOCUMENTATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF DEMOLITION / NEW WORK AND THE PURCHASE OF NEW EQUIPMENT. SHOULD THERE BE A CONFLICT, THE CONTRACTOR SHALL ALERT THE ARCHITECT / ENGINEER IN WRITING.
2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACE OUTSIDE THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE EXISTING CONDITIONS AND/OR FINISHES DAMAGED DURING CONSTRUCTION, INCLUDING PATCHING AND PAINTING DEEMED NECESSARY BY THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
3. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

X MECHANICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING ELECTRIC DUCT HEATING COIL (EHC) IN APPROXIMATELY THIS LOCATION.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING DUCTWORK INSULATION FOR ALL DUCTWORK ASSOCIATED WITH THE INDICATED ROOFTOP UNIT (RTU), INCLUDING ALL DUCT MAINS AND BRANCH DUCTWORK. FIELD VERIFY DUCTWORK MATERIAL, DUCT RUNS, AND DUCT SIZING.

1 MECHANICAL FIRST FLOOR DEMOLITION PLAN

SCALE: 1/16" = 1'-0"

PROJECT NORTH

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NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

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STATE OF NEW YORK · JOHN C. MORRIS III · LICENSED PROFESSIONAL ENGINEER · 057554-1

05/31/2028
Exp. Date

J. CHRIS MORRIS III, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 057554

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W. MAGIERA	W. MAGIERA	K. WEILER	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

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VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

Pursuit of Excellence

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SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

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SHEET TITLE

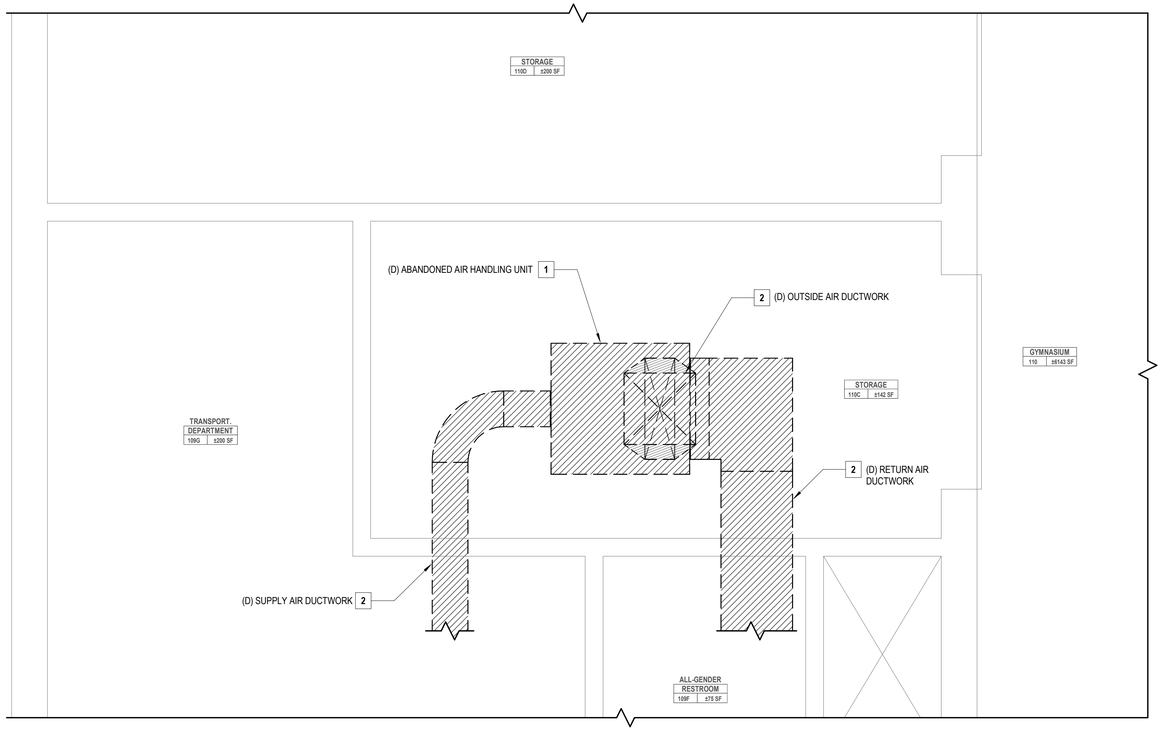
MECHANICAL FIRST FLOOR DEMOLITION PLAN

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1 MECHANICAL FIRST FLOOR DEMOLITION PLAN - GYM STORAGE

SCALE: 1/2" = 1'-0"

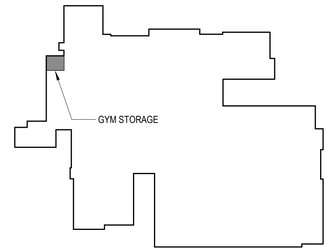
PROJECT NORTH

GENERAL NOTES

1. THE EXISTING CONDITIONS SHOWN ON THE CONTRACT DRAWINGS ARE BASED ON LIMITED FIELD SURVEY AND EXISTING DOCUMENTATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF DEMOLITION / NEW WORK AND THE PURCHASE OF NEW EQUIPMENT. SHOULD THERE BE A CONFLICT, THE CONTRACTOR SHALL ALERT THE ARCHITECT / ENGINEER IN WRITING.
2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACE OUTSIDE THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE EXISTING CONDITIONS AND/OR FINISHES DAMAGED DURING CONSTRUCTION, INCLUDING PATCHING AND PAINTING DEEMED NECESSARY BY THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
3. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

X MECHANICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING ABANDONED AIR HANDLING UNIT (AHU) LOCATED IN THE GYM STORAGE ROOM IN ITS ENTIRETY. THIS SHALL INCLUDE THE AIR HANDLING UNIT AND ALL EQUIPMENT HANGERS AND SUPPORTS.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE SUPPLY, RETURN, AND OUTSIDE AIR DUCTWORK ASSOCIATED WITH THE ABANDONED AIR HANDLING UNIT (AHU). FIELD-VERIFY THE EXTENT OF ALL DUCTWORK ASSOCIATED WITH THIS UNIT. REMOVAL SHALL INCLUDE ALL DUCTWORK, DUCTWORK INSULATION, DUCT HANGERS, AND SUPPORTS, AND ALL RELATED APPURTENANCES.



KEY PLAN

SCALE: 1" = 100'-0"

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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · JOHN C. MORRIS III · LICENSED PROFESSIONAL ENGINEER · 057554-1

05/31/2028
Exp. Date

J. CHRIS MORRIS III, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 057554

"IN ACCORDANCE WITH ARTICLE 145, SECTION 7209 OF THE NYS EDUCATION LAW, ALTERATION OF THIS DOCUMENT EXCEPT BY A LICENSED PROFESSIONAL IS ILLEGAL."

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
W. MAGIERA	W. MAGIERA	K. WEILER	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

MECHANICAL
FIRST FLOOR DEMOLITION PLAN

DRAWING No.

SI-MD 111.00

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1 MECHANICAL ROOF DEMOLITION PLAN

SCALE: 1/16" = 1'-0"

PROJECT NORTH

GENERAL NOTES

1. THE EXISTING CONDITIONS SHOWN ON THE CONTRACT DRAWINGS ARE BASED ON LIMITED FIELD SURVEY AND EXISTING DOCUMENTATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF DEMOLITION / NEW WORK AND THE PURCHASE OF NEW EQUIPMENT. SHOULD THERE BE A CONFLICT, THE CONTRACTOR SHALL ALERT THE ARCHITECT / ENGINEER IN WRITING.
2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACE OUTSIDE THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE EXISTING CONDITIONS AND/OR FINISHES DAMAGED DURING CONSTRUCTION, INCLUDING PATCHING AND PAINTING DEEMED NECESSARY BY THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
3. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

X MECHANICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE EXISTING EXHAUST FAN AND THE ASSOCIATED ROOF CURB IN APPROXIMATELY THIS LOCATION. THE CONTRACTOR SHALL FIELD VERIFY EXISTING ROOF OPENING DIMENSIONS PRIOR TO DEMOLITION AND ORDERING OF NEW EQUIPMENT. DISCONNECT, REMOVE, AND DISPOSE OF EXISTING BACKDRAFT DAMPER (IF APPLICABLE). TEMPORARILY CAP DUCTWORK UNTIL NEW REPLACEMENT EXHAUST FAN CAN BE INSTALLED. TEMPORARILY SEAL ROOF OPENINGS TO MAKE WEATHERTIGHT UNTIL NEW EXHAUST FANS ARE INSTALLED DURING THE NEW WORK PHASE.
2. THE CONTRACTOR SHALL DISCONNECT, REMOVE, AND DISPOSE OF THE OUTSIDE AIR INTAKE (OAI) PENTHOUSE SERVING THE ABANDONED AIR HANDLING UNIT (AHU) IN THE GYM STORAGE ROOM), INCLUDING THE ASSOCIATED ROOF CURB, ROOF OPENING, AND ALL CONNECTED DUCTWORK.

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NY Engineering Certificate of Authorization No.: 0018178

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PROJECT No:	DATE:	SCALE:
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CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

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SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT M
MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

MECHANICAL ROOF DEMOLITION PLAN

DRAWING No.

SI-MD 112.00

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4. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.

X MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW IN-KIND REPLACEMENT ELECTRIC DUCT HEATING COIL (EHC) IN APPROXIMATELY THIS LOCATION. RE-INTEGRATE DUCT HEATERS INTO EXISTING BUILDING CONTROLS TO MAINTAIN SEQUENCES OF OPERATION.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW DUCTWORK INSULATION FOR ALL DUCTWORK ASSOCIATED WITH THE INDICATED ROOFTOP UNIT (RTU), INCLUDING ALL DUCT MAINS AND BRANCH DUCTWORK. FIELD VERIFY DUCTWORK MATERIAL, DUCT RUNS, AND DUCT SIZING. REFER TO SPECIFICATIONS FOR DUCTWORK INSULATION TYPES.



1 **MECHANICAL FIRST FLOOR NEW WORK PLAN**
SCALE: 1/16" = 1'-0"

PROJECT NORTH

H 2 M architects + engineers

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SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

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MECHANICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

MECHANICAL
FIRST FLOOR NEW WORK PLAN

DRAWING No.

SI-M 110.00

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[X] MECHANICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEW REPLACEMENT ROOF-MOUNTED EXHAUST FAN IN APPROXIMATELY THIS LOCATION. FURNISH AND INSTALL ON A NEW APPROVED WIND-RATED ROOF CURB. RE-CONNECT TO EXISTING DUCTWORK AND CONTROLS.
2. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEW APR CONTROL VALVE INTO THE INDICATED EXISTING ROOFTOP UNIT (RTU) DX REFRIGERATION CIRCUIT. REFER TO SCHEDULE FOR VALVE SIZE AND DETAIL FOR PIPING SCHEMATIC.

PROJECT NORTH

1 MECHANICAL ROOF NEW WORK PLAN

SCALE: 1/16" = 1'-0"

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SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

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CONTRACT
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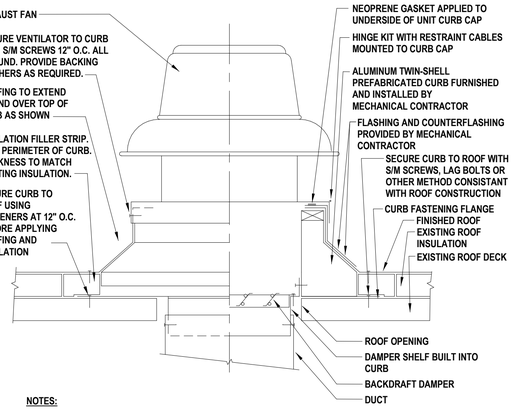
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ROOF NEW WORK PLAN

DRAWING No.
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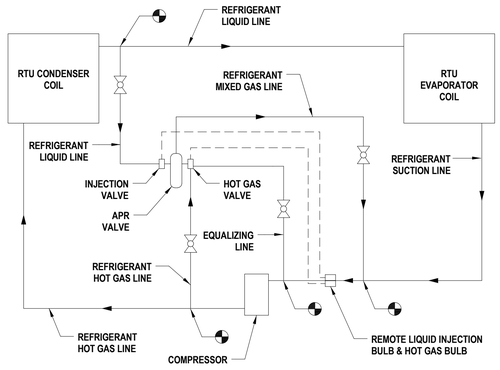


NOTES:

1. CURBS AND EXHAUST FANS SHALL BE FROM THE SAME MANUFACTURER. MECHANICAL CONTRACTOR SHALL RE-USE OR MODIFY EXISTING ROOF CURB AS REQUIRED.
2. ROOF OPENING IN ACCORDANCE WITH THE MANUFACTURER'S APPROVED SHOP DRAWINGS. MECHANICAL CONTRACTOR SHALL RE-USE OR MODIFY EXISTING ROOF OPENING WHERE REQUIRED.
3. ALL FLASHING AND ROOF WORK BY MECHANICAL CONTRACTOR.

1 DOWNBLAST EXHAUST FAN & CURB DETAIL

SCALE:NTS

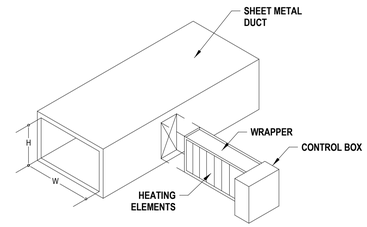


NOTES:

1. FURNISH AND INSTALL APR VALVE IN ACCORDANCE WITH THE VALVE AND THE RTU MANUFACTURER'S INSTALLATION INSTRUCTIONS.

2 APR VALVE REFRIGERANT PIPING DETAIL

SCALE:NTS

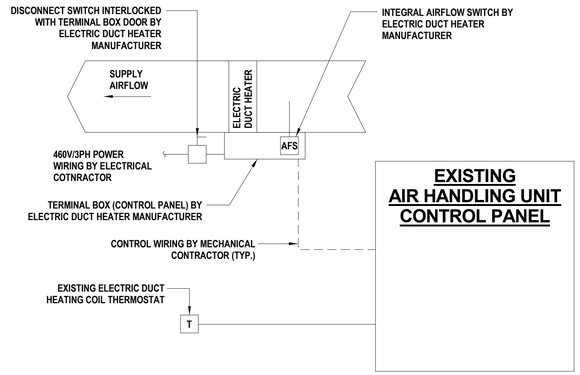


NOTES:

1. DUCT HEATER SHALL BE INSTALLED A MINIMUM OF FOUR (4) FEET FROM ANY TRANSITION IN DUCT SIZE OR DOWNSTREAM FROM ANY AIR HANDLING UNIT.
2. DUCT HEATER SHALL BE INSTALLED A MINIMUM OF TWO (2) FEET FROM EITHER SIDE OF AN ELBOW OR TURN.
3. FIELD-COORDINATE CONTROL CABINET ORIENTATION.
4. INSTALL IN DUCTWORK WITH INSULATION. MODIFY / CUT THE INSULATION PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

3 SLIP-IN ELECTRIC DUCT HEATER DETAIL

SCALE:NTS



NOTES:

1. MECHANICAL CONTRACTOR SHALL PROVIDE WIRING DIAGRAM BY ELECTRIC DUCT HEATING COIL MANUFACTURER FOR COORDINATION WITH EXISTING AUTOMATIC TEMPERATURE CONTROL SYSTEM.
2. MECHANICAL CONTRACTOR SHALL RE-USE EXISTING BMS CONTROL POINTS WHERE APPLICABLE.
3. ELECTRIC DUCT HEATER INTERLOCKS WITH EXISTING EQUIPMENT SHALL BE MAINTAINED.
4. THE EXISTING WALL THERMOSTATS SHALL BE RE-USED.

4 ELECTRIC DUCT HEATING COIL CONTROL DIAGRAM

SCALE:NTS

GENERAL NOTES:

1. ALL POWER WIRING ABOVE 120V TO BE UNDER DIV. 26, ELECTRICAL.
2. LOW VOLTAGE "CONTROL" WIRING BY DIV. 23, MECHANICAL, EXCEPT AS NOTED.
3. REFER TO SPECIFICATIONS FOR SEQUENCE OF OPERATIONS. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS.
4. UNITARY CONTROLLERS SHALL HAVE INTERNAL CONTROL LOGIC CAPABLE OF FULL OPERATION OF THE EQUIPMENT IN THE EVENT THE EQUIPMENT IS NOT CONNECTED TO THE BMS.
5. PROVIDE 120V POWER FOR ALL CONTROL PANELS BY DIV. 26, ELECTRICAL, TYP. FOR ALL.

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MECHANICAL DETAILS AND CONTROL DIAGRAMS

DRAWING No.

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ELECTRIC DUCT HEATING COIL SCHEDULE

TAG	ASSOCIATED RTU	MANUFACTURER	MODEL NO.	TYPE	COIL DIMENSIONS (L x W)	DUCT DIMENSIONS (L x W)	AIRFLOW (CFM)	VELOCITY (FPM)	STATIC PRESSURE DROP (IN W.C.)	HEATING CAPACITY		AIR TEMP		ELECTRICAL (V/PH/HZ)	CAPACITY CONTROL	NOTES
										KW	MBH	EAT (DEG. F)	LAT (DEG. F)			
EHC-1	RTU-1	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-2	RTU-1	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-3	RTU-1	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-4	RTU-1	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-5	RTU-1	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-6	RTU-1	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-7	RTU-1	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-8	RTU-1	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-9	RTU-1	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-10	RTU-1	INDEECO	QUA	OPEN COIL	18x10	18x9	1,000	800	0.10	12.5	46.1	52.5	95.2	460/3/60	SCR	1-9
EHC-11	RTU-1	INDEECO	QUA	OPEN COIL	28x12	26x12	2,400	1,029	0.10	30.0	102.0	52.5	91.9	460/3/60	SCR	1-9
EHC-12	RTU-2	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-13	RTU-2	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-14	RTU-2	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-15	RTU-2	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-16	RTU-2	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-17	RTU-2	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-18	RTU-2	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-19	RTU-2	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-20	RTU-2	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-21	RTU-2	INDEECO	QUA	OPEN COIL	18x10	18x9	1,000	800	0.10	12.5	41.6	52.5	91.0	460/3/60	SCR	1-9
EHC-22	RTU-2	INDEECO	QUA	OPEN COIL	28x12	26x12	2,400	1,029	0.10	30.0	102.0	52.5	91.9	460/3/60	SCR	1-9
EHC-23	RTU-3	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-24	RTU-3	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-25	RTU-3	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-26	RTU-3	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-27	RTU-3	INDEECO	QUA	OPEN COIL	26x10	18x10	1,200	665	0.10	20.0	68.4	52.5	105.3	460/3/60	SCR	1-9
EHC-28	RTU-3	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-29	RTU-3	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-30	RTU-3	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-31	RTU-3	INDEECO	QUA	OPEN COIL	18x10	18x8	900	720	0.10	15.0	51.3	52.5	105.3	460/3/60	SCR	1-9
EHC-32	RTU-3	INDEECO	QUA	OPEN COIL	18x10	18x9	1,000	800	0.10	12.5	46.1	52.5	95.2	460/3/60	SCR	1-9
EHC-33	RTU-3	INDEECO	QUA	OPEN COIL	28x12	26x12	2,400	1,029	0.10	30.0	102.0	52.5	91.9	460/3/60	SCR	1-9
EHC-34	RTU-4	INDEECO	QUA	OPEN COIL	20x8	18x8	900	810	0.10	9.0	31.2	59.5	91.6	460/3/60	SCR	1-9
EHC-35	RTU-4	INDEECO	QUA	OPEN COIL	20x8	18x8	900	810	0.10	9.0	31.2	59.5	91.6	460/3/60	SCR	1-9
EHC-36	RTU-4	INDEECO	QUA	OPEN COIL	30x20	30x18	3,245	779	0.10	32.5	110.5	59.5	91.0	460/3/60	SCR	1-9
EHC-37	RTU-4	INDEECO	QUA	OPEN COIL	30x20	26x18	2,995	719	0.10	30.0	102.6	59.5	91.2	460/3/60	SCR	1-9
EHC-38	RTU-5	INDEECO	QUA	OPEN COIL	48x16	32x12	5,000	938	0.10	60.0	204.0	49	86.8	460/3/60	SCR	1-9
EHC-39	RTU-5	INDEECO	QUA	OPEN COIL	48x16	32x12	5,000	938	0.10	60.0	204.0	49	86.8	460/3/60	SCR	1-9
EHC-40	RTU-6	INDEECO	QUA	OPEN COIL	12x10	12x6	400	480	0.10	4.0	13.9	63	95.2	460/3/60	SCR	1-9
EHC-41	RTU-6	INDEECO	QUA	OPEN COIL	20x8	20x7	800	720	0.10	8.0	27.8	63	95.2	460/3/60	SCR	1-9
EHC-42	RTU-6	INDEECO	QUA	OPEN COIL	12x10	15x6	500	600	0.10	5.0	17.4	63	95.2	460/3/60	SCR	1-9
EHC-43	RTU-6	INDEECO	QUA	OPEN COIL	12x10	12x6	350	420	0.10	4.0	13.6	63	99.0	460/3/60	SCR	1-9
EHC-44	RTU-6	INDEECO	QUA	OPEN COIL	12x10	12x6	350	420	0.10	4.0	13.6	63	99.0	460/3/60	SCR	1-9
EHC-45	RTU-6	INDEECO	QUA	OPEN COIL	12x10	12x7	450	540	0.10	5.0	17.0	63	98.0	460/3/60	SCR	1-9
EHC-46	RTU-6	INDEECO	QUA	OPEN COIL	16x8	15x9	300	338	0.10	2.5	8.9	63	90.5	460/3/60	SCR	1-9
EHC-47	RTU-6	INDEECO	QUA	OPEN COIL	12x8	12x6	200	267	0.10	2.0	5.8	63	89.9	460/3/60	SCR	1-9
EHC-48	RTU-6	INDEECO	QUA	OPEN COIL	12x8	10x5	200	267	0.10	2.0	5.8	63	89.9	460/3/60	SCR	1-9
EHC-49	RTU-6	INDEECO	QUA	OPEN COIL	12x8	10x5	200	267	0.10	2.0	5.8	63	89.9	460/3/60	SCR	1-9
EHC-50	RTU-7	INDEECO	QUA	OPEN COIL	16x10	15x9	830	747	0.10	12.5	42.5	42	89.4	460/3/60	SCR	1-9
EHC-51	RTU-7	INDEECO	QUA	OPEN COIL	30x10	36x9	1,660	797	0.10	25.0	85.0	42	89.4	460/3/60	SCR	1-9
EHC-52	RTU-7	INDEECO	QUA	OPEN COIL	30x10	36x9	1,660	797	0.10	25.0	85.0	42	89.4	460/3/60	SCR	1-9
EHC-53	RTU-7	INDEECO	QUA	OPEN COIL	24x8	24x7	1,020	765	0.10	15.0	51.0	42	88.3	460/3/60	SCR	1-9
EHC-54	RTU-7	INDEECO	QUA	OPEN COIL	30x10	30x8	1,400	672	0.10	20.0	68.0	42	87.0	460/3/60	SCR	1-9
EHC-55	RTU-7	INDEECO	QUA	OPEN COIL	30x10	36x7	1,600	768	0.10	22.5	76.5	42	86.3	460/3/60	SCR	1-9
EHC-56	RTU-7	INDEECO	QUA	OPEN COIL	16x10	15x9	830	747	0.10	12.5	42.5	42	89.4	460/3/60	SCR	1-9
EHC-57	RTU-8	INDEECO	QUA	OPEN COIL	18x10	18x9	1,000	800	0.10	10.0	34.0	52.5	84.0	460/3/60	SCR	1-9
EHC-58	RTU-8	INDEECO	QUA	OPEN COIL	18x12	18x12	1,500	1,000	0.10	17.5	59.5	52.5	89.2	460/3/60	SCR	1-9
EHC-59	RTU-8	INDEECO	QUA	OPEN COIL	16x8	15x5	300	338	0.10	4.0	13.6	52.5	84.5	460/3/60	SCR	1-9
EHC-60	RTU-8	INDEECO	QUA	OPEN COIL	12x10	12x10	750	900	0.10	9.0	30.6	52.5	90.3	460/3/60	SCR	1-9
EHC-61	RTU-8	INDEECO	QUA	OPEN COIL	12x10	12x10	750	900	0.10	9.0	30.6	52.5	90.3	460/3/60	SCR	1-9
EHC-62	RTU-8	INDEECO	QUA	OPEN COIL	12x10	12x9	650	780	0.10	7.0	23.8	52.5	86.4	460/3/60	SCR	1-9
EHC-63	RTU-8	INDEECO	QUA	OPEN COIL	12x8	8x5	150	225	0.10	2.0	6.8	52.5	94.5	460/3/60	SCR	1-9

NOTES:
1. EQUIPMENT SCHEDULE BASED ON 1995 DESIGN DRAWINGS. CONTRACTOR SHALL FIELD VERIFY EXISTING EQUIPMENT CAPACITIES AND DIMENSIONS PRIOR TO ORDERING.
2. PROVIDE PROPORTIONAL CONTROL USING AN SCR PROPORTIONAL POWER CONTROLLER.
3. PROVIDE AUTOMATIC AND MANUAL RESET THERMAL CUTOUTS, AIRFLOW SWITCH, AND MAGNETIC CONTRACTORS.
4. PROVIDE 24V CONTROLS TRANSFORMER. RE-INTEGRATE INTO EXISTING CONTROLS.
5. PROVIDE BUILT-IN, SNAP-ACTING DISCONNECT SWITCH WITH DOOR INTERLOCK.
6. COORDINATE CONTROLS WITH EXISTING ATC/DDC SYSTEM.
7. PROVIDE FUSES FOR HEATERS GREATER THAN 48 AMPS.
8. INSTALL HEATERS IN EXISTING DUCTWORK ACCORDING TO MANUFACTURER'S RECOMMENDATIONS AND MINIMUM CLEARANCES. MODIFY DUCTWORK AS REQUIRED.
9. ELBOWS OR TURNS MUST BE LOCATED A MINIMUM OF 4 FEET FROM HEATER INLET AND 2 FEET FROM HEATER OUTLET.

ACTIVE PROPORTIONAL REGULATOR (APR) VALVE SCHEDULE

RTU TAG	RTU MANUFACTURER	RTU MODEL NO.	RTU COOLING TONNAGE	VALVE MANUFACTURER	VALVE MODEL NO.	COOLING TYPE	REFRIG. TYPE	VALVE MODULATION ON LEAD CIRCUIT (TONS)	NOTES
AC-1	TRANE	TED420B4B-	35.0	RAWAL	APR-410-6	DX	R-410A	6.0	1-3
AC-2	TRANE	TED420B4B-	35.0	RAWAL	APR-410-6	DX	R-410A	6.0	1-3
AC-3	TRANE	TED330B4B-	27.5	RAWAL	APR-410-6	DX	R-410A	6.0	1-3
AC-5	TRANE	TED360B4C-	30.0	RAWAL	APR-410-6	DX	R-410A	6.0	1-3
AC-6	TRANE	THC120F4RGA-	10.0	RAWAL	APR-410-1	DX	R-410A	1.0	1-3
AC-7	TRANE	TED360B4C-	30.0	RAWAL	APR-410-6	DX	R-410A	6.0	1-3
AC-8	TRANE	THD150G4RGB-	12.5	RAWAL	APR-410-5	DX	R-410A	5.0	1-3
AC-9	TRANE	THD150G4RGB-	12.5	RAWAL	APR-410-5	DX	R-410A	5.0	1-3
AC-10	TRANE	THC047E4RGA-	4.0	RAWAL	APR-410-1	DX	R-410A	1.0	1-3
AC-11	TRANE	THC037E4REA-	3.0	RAWAL	APR-410-1	DX	R-410A	1.0	1-3
AC-12	TRANE	THD150G4RPB-	12.5	RAWAL	APR-410-5	DX	R-410A	1.0	1-3

NOTES:
1. FURNISH AND INSTALL NEW RAWAL APR VALVE ONTO EXISTING TRANE DX ROOFTOP UNITS.
2. FURNISH AND INSTALL VALVES IN ACCORDANCE WITH THE VALVE AND RTU MANUFACTURER'S RECOMMENDATIONS AND INSTALLATION INSTRUCTIONS.
3. VALVES TO BE INSTALLED TO ALLOW UNITS TO RUN COMPRESSORS LONGER AND PROVIDE MORE DEHUMIDIFICATION CAPABILITY.

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CONSULTANTS:

MARK	DATE	DESCRIPTION

STATE OF NEW YORK · JOHN C. MORRIS III · LICENSED PROFESSIONAL ENGINEER · 057554-1

05/31/2028
Exp. Date

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W. MAGIERA	W. MAGIERA	K. WEILER	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

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SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

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DRAWING No.

SI-M 601.00

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ELECTRICAL LEGEND

SYMBOL	DESCRIPTION	COMMENTS
S_3	THREE - WAY SWITCH	46" AFF TO CL UON
S_4	FOUR - WAY SWITCH	46" AFF TO CL UON
S_I	ILLUMINATED SWITCH	46" AFF TO CL UON
S^A	SINGLE POLE SWITCH; "A" INDICATES SWITCH CONTROL	46" AFF TO CL UON
S_D	SINGLE POLE DIMMER SWITCH	46" AFF TO CL UON
S_{3D}	THREE - WAY DIMMER SWITCH	46" AFF TO CL UON
S_K	SINGLE POLE KEYED SWITCH	46" AFF TO CL UON
S_{K3}	KEYED THREE - WAY SWITCH	46" AFF TO CL UON
S_{K4}	KEYED FOUR - WAY SWITCH	46" AFF TO CL UON
S_M	HORSEPOWER RATED SWITCH, WITH INDICATOR (CONTRACTOR SHALL COORDINATE VOLTAGE AND PHASE WITH EQUIPMENT)	46" AFF
S_P	SWITCH AND PILOT LIGHT	
S_T	SWITCH WITH THERMAL OVERLOAD PROTECTION (CONTRACTOR SHALL COORDINATE VOLTAGE AND PHASE WITH EQUIPMENT)	
S_{OS}	OCCUPANCY SENSOR WITH MANUAL OVERRIDE, WALL MOUNT	
TC	TIME CLOCK	
PC	PHOTOCELL	
PB	PUSH BUTTON	
E,G	EMERGENCY SHUT OFF SWITCH; 'E' INDICATES ELECTRICAL; 'G' INDICATES GAS	
OS	OCCUPANCY SENSOR, CEILING MOUNT	
	OCCUPANCY SENSOR POWER PACK, MOUNTED ABOVE CEILING	
	2 #12 AWG + #12 AWG GND IN 3/4" E.C. CONCEALED IN WALL OR CEILING	
	5 #12 AWG + #12 AWG GND IN 3/4" E.C. CONCEALED IN WALL OR CEILING	
	3 #12 AWG + #12 AWG GND IN 3/4" E.C. CONCEALED IN OR BELOW SLAB	
LP1-35	DEDICATED HOME RUN TO PANEL LP1 FOR CIRCUIT No. 35 ONLY. 2 #12 AWG + #12 AWG GND IN 3/4" E.C. CONCEALED IN WALL OR CEILING	
	SIMPLEX RECEPTACLE: 120V, 20A. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
	DUPLEX RECEPTACLE: 120V, 20A. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
	QUAD RECEPTACLE, DOUBLE DUPLEX RECEPTACLE: 120V, 20A. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
C	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "C" INDICATES CEILING MOUNT.	FLUSH
	DUPLEX RECEPTACLE: 120V, 20A; FLOOR MOUNTED.	FLUSH
IG	ISOLATED GROUND DUPLEX RECEPTACLE. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
GFI	DUPLEX RECEPTACLE: 120V, 20A; WITH GROUND FAULT INDICATOR. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
UC	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "UC" INDICATES UNDER COUNTER	AS PER ENGINEER
CT	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "CT" INDICATES COUNTER TOP.	AS PER ENGINEER
WP	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "WP" INDICATED WEATHER PROOF	AS PER ENGINEER
40 240	SPECIAL PURPOSE OUTLET: 240V, 40A. VERIFY NEMA CONFIGURATION WITH EQUIPMENT MANUFACTURER.	AS PER ENGINEER
TL	TWISTED LOCK RECEPTACLE: 125V, 20A, 3 WIRE; UNLESS OTHERWISE NOTED.	AS PER ENGINEER
	SURFACE RACEWAY WITH 2 GROUNDED AND ISOLATED TYPE DUPLEX RECEPTACLES AND 1 DATA OUTLET PER POSITION, 18" AFF UNLESS OTHERWISE NOTED.	
	TELEPHONE/POWER POLE	
S_{S1}	MAGNETIC STARTER "S1"; SEE STARTER SCHEDULE	
DS_{DS1}	DISCONNECTION SWITCH "DS1"; SEE DISCONNECT SWITCH SCHEDULE.	
J	JUNCTION BOX	
J_{4X}	NEMA 4X STAINLESS STEEL JUNCTION BOX WITH GASKET COVER.	
J_S	JUNCTION BOX RECESSED IN WALL WITH BLANK COVER. PROVIDE 3/4" E.C. AND DRAG LINE TO ABOVE FINISHED CEILING. MOUNT 18" AFF, UNLESS OTHERWISE NOTED.	
J_M	FOR MONITOR, JUNCTION BOX RECESSED IN WALL WITH BLANK COVER. PROVIDE 3/4" E.C. AND DRAG LINE TO ABOVE FINISHED CEILING.	
T_{T1}	TRANSFORMER "T1"; SEE TRANSFORMER SCHEDULE.	
	ELECTRICAL PANEL "P1", RECESSED; SEE PANEL SCHEDULE.	
P1	ELECTRICAL PANEL "P1", SURFACE MOUNT; SEE PANEL SCHEDULE.	
	CONDUIT GOING UP.	
	CONDUIT GOING DOWN.	
	PULLBOX	
T	TELEPHONE. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	
TV	CABLE TELEVISION. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	
D	DATA. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	
D/T	COMBINED DATA AND TV. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	
S	SECURITY CAMERA. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	

ABBREVIATION	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
AFC	ABOVE FINISHED CEILING
AFG	ABOVE FINISHED GRADE
AMP, A	AMPERE
ATS	AUTOMATIC TRANSFER SWITCH; SEE TRANSFER SWITCH SCHEDULE
AWG	AMERICAN WIRE GAUGE
BFC	BELOW FINISHED CEILING
CL	CENTERLINE
CT	COUNTERTOP
EC	ELECTRICAL CONDUIT
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFI	GROUND FAULT INDICATOR
PSEG	PUBLIC SERVICE ELECTRIC AND GAS COMPANY (LOCAL ELECTRIC UTILITY)
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
NTS	NOT TO SCALE
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UC	UNDERCOUNTER
V	VOLTS
VAC	VOLTS ALTERNATING CURRENT
VDC	VOLT DIRECT CURRENT
X-FMR	TRANSFORMER
WP	WEATHERPROOF

SYMBOL	DESCRIPTION	COMMENTS
T	LINE VOLTAGE THERMOSTAT, 120V, 10A.	
	CIRCUIT BREAKER WITH TRIP AND POLES AS NOTED.	
TS1	TRANSFER SWITCH TS1; SEE TRANSFER SWITCH SCHEDULE.	
M.C.B 30A/2P PANEL "P1"	DISTRIBUTION PANEL P1 WITH 30A, 2 POLE M.C.B.; SEE DISTRIBUTION PANEL SCHEDULE.	
	DISCONNECT SWITCH DS1, 100A, 3 POLES; SEE DISCONNECT SWITCH SCHEDULE.	
DS3 100A/3P	FUSED DISCONNECT SWITCH DS2, FUSED AT 40A, 3 POLES; SEE DISCONNECT SWITCH SCHEDULE.	
G1	GENERATOR SET G1	
M	ELECTRIC METER AND METER PAN AS PER PSEG REQUIREMENTS.	
5	MOTOR, NUMBER INDICATED HORSEPOWER.	
	CURRENT TRANSFORMER.	
PTS	VOLTAGE TRANSFORMER.	
T2	TRANSFORMER WITH SIZE, PRIMARY AND SECONDARY VOLTAGES AS NOTED.	
RVRM 10	REDUCED VOLTAGE SOLID STATE RAMPING MODULE, SIZED FOR 10 H.P.	
RVSS 150	REDUCED VOLTAGE SOLID STATE STARTER, SIZED FOR 150 H.P.	
VFD 25	VARIABLE FREQUENCY DRIVE, RATED FOR 25 H.P.	
FVNR 5	FULL VOLTAGE NON-REVERSING STARTER, NEMA SIZE 6	
FVR 5	FULL VOLTAGE REVERSING STARTER, NEMA SIZE 5	
JJS	FAST ACTING SOLID STATE FUSES AS PER MANUFACTURER.	
	MULTIPLE BRANCH CIRCUITS AS REQUIRED.	
LNR	5% LINE REACTOR, UNLESS OTHERWISE NOTED	
	CONTROL CIRCUIT; MIN 2 #12 AWG IN 3/4" E.C. UNLESS OTHERWISE NOTED ON PLANS	

CONTROLS LEGEND

SYMBOL	DESCRIPTION	COMMENTS
	PUMP OR BLOWER MOTOR	
	FLOR METER	
M	MOTOR CONTROLLED VALVE WITH LIMIT SWITCHES	
LS	LIMIT SWITCH	
FT	FLOW TRANSMITTER	
FS	FLOW SWITCH	
PT	PRESSURE TRANSMITTER	
PS	PRESSURE SWITCH	
LT	LEVEL TRANSMITTER	
LE	LEVEL ELECTRODES	
DP	DIFFERENTIAL PRESSURE TRANSMITTER	
	SOLENOID VALVE	
	PITOT TUBE AND AIR PRESSURE SWITCH	
TLDS	PITOT TUBE AND AIR PRESSURE SWITCH	
PID	PROPORTIONAL - INTEGRAL - DERIVATIVE SINGLE LOOP CONTROLLER	
SC TP—A	SINGLE CONDITIONER TIME PULSE DURATION TO ANALOG	

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CONSULTANTS:

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S. FREEMAN	W. TESTA	S. SOUSSOU	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

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GENERAL NOTES

1. THE EXISTING CONDITIONS SHOWN ON THE CONTRACT DRAWINGS ARE BASED ON LIMITED FIELD SURVEY AND EXISTING DOCUMENTATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF DEMOLITION / NEW WORK AND PURCHASE OF NEW EQUIPMENT. SHOULD THERE BE A CONFLICT, THE CONTRACTOR SHALL ALERT THE ARCHITECT / ENGINEER IN WRITING.
2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING EXISTING CONDITIONS AND/OR FINISHES DAMAGED DURING CONSTRUCTION, INCLUDING PATCHING AND PAINTING DEEMED NECESSARY BY THE ARCHITECT AT NO COST TO THE OWNER.
3. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
4. CONTRACTOR SHALL DISCONNECT AND REMOVE THE EXISTING LIGHT FIXTURES AND STORE FOR REINSTALLATION AFTER NEW DROP CEILINGS ARE INSTALLED. EXISTING WIRING SHALL BE MADE SAFE TO ENABLE THE INSTALLATION OF THE NEW CEILING.
5. CONTRACTOR SHALL REMOVE AND TEMPORARY SUPPORT THE EXISTING EXIT SIGNS, SPEAKERS, OCCUPANCY SENSORS, SMOKE / HEAT DETECTORS, WIRELESS ACCESS POINTS, ETC. TO ENABLE THE REMOVAL OF THE EXISTING DROP CEILINGS.

X ELECTRICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT EXISTING ELECTRIC DUCT HEATING COIL (EHC) AND REMOVE DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT ELECTRIC DUCT HEATING COIL (SEE NEW WORK PLANS).
2. THE CONTRACTOR SHALL DISCONNECT ABANDONED AIR HANDLING UNIT AND REMOVE DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE ABANDONED IN PLACE AND MADE SAFE.

1 ELECTRICAL FIRST FLOOR DEMOLITION PLAN

SCALE: 1/16" = 1'-0"

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3. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

X ELECTRICAL DEMOLITION KEYNOTES

1. THE CONTRACTOR SHALL DISCONNECT EXISTING EXHAUST FAN AND REMOVE DISCONNECT SWITCH. CONDUIT AND WIRING FEEDING THE UNIT SHALL BE CAPPED AND MADE SAFE FOR EXTENSION TO THE REPLACEMENT EXHAUST FAN (SEE NEW WORK PLANS).
2. EXISTING TO REMAIN.



1 ELECTRICAL ROOF DEMOLITION PLAN
SCALE: 1/16" = 1'-0"

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
S. FREEMAN	W. TESTA	S. SOUSSOU	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

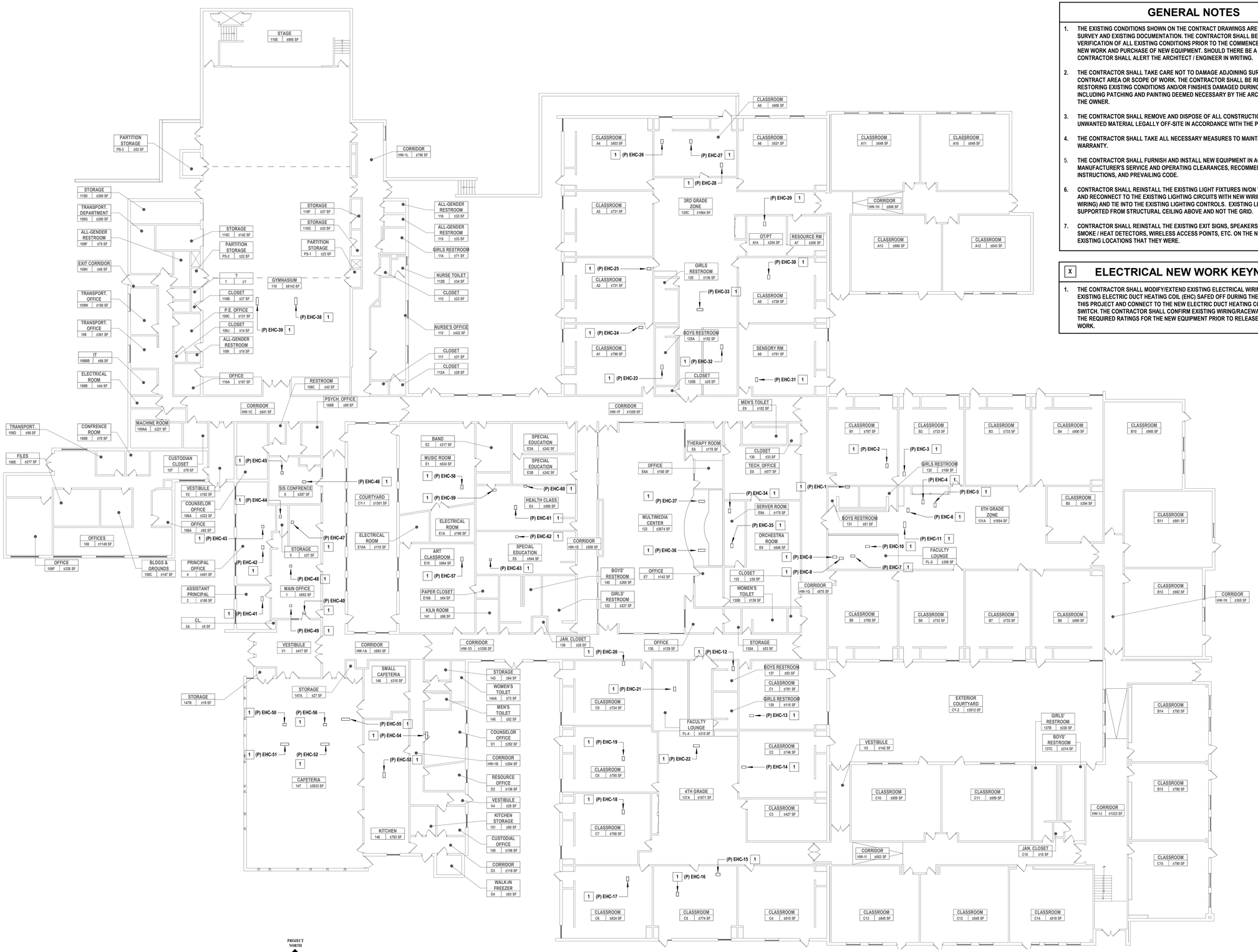
SED SUBMISSION

SHEET TITLE

ELECTRICAL ROOF DEMOLITION PLAN

DRAWING No.

SI-ED101.00



1 ELECTRICAL FIRST FLOOR NEW WORK PLAN

SCALE: 1/16" = 1'-0"

GENERAL NOTES

1. THE EXISTING CONDITIONS SHOWN ON THE CONTRACT DRAWINGS ARE BASED ON LIMITED FIELD SURVEY AND EXISTING DOCUMENTATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF DEMOLITION / NEW WORK AND PURCHASE OF NEW EQUIPMENT. SHOULD THERE BE A CONFLICT, THE CONTRACTOR SHALL ALERT THE ARCHITECT / ENGINEER IN WRITING.
2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING EXISTING CONDITIONS AND/OR FINISHES DAMAGED DURING CONSTRUCTION, INCLUDING PATCHING AND PAINTING DEEMED NECESSARY BY THE ARCHITECT AT NO COST TO THE OWNER.
3. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL LEGALLY OFF-SITE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN THE EXISTING ROOF WARRANTY.
5. THE CONTRACTOR SHALL FURNISH AND INSTALL NEW EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S SERVICE AND OPERATING CLEARANCES, RECOMMENDATIONS, INSTALLATION INSTRUCTIONS, AND PREVAILING CODE.
6. CONTRACTOR SHALL REINSTALL THE EXISTING LIGHT FIXTURES IN/ON THE NEW DROP CEILINGS AND RECONNECT TO THE EXISTING LIGHTING CIRCUITS WITH NEW WIRING (MATCH EXISTING WIRING) AND TIE INTO THE EXISTING LIGHTING CONTROLS. EXISTING LIGHTING SHALL BE SUPPORTED FROM STRUCTURAL CEILING ABOVE AND NOT THE GRID.
7. CONTRACTOR SHALL REINSTALL THE EXISTING EXIT SIGNS, SPEAKERS, OCCUPANCY SENSORS, SMOKE / HEAT DETECTORS, WIRELESS ACCESS POINTS, ETC. ON THE NEW DROP CEILING AT THE EXISTING LOCATIONS THAT THEY WERE.

X ELECTRICAL NEW WORK KEYNOTES

1. THE CONTRACTOR SHALL MODIFY/EXTEND EXISTING ELECTRICAL WIRING/RACEWAY THAT FED EXISTING ELECTRIC DUCT HEATING COIL (EHC) SAFED OFF DURING THE DEMOLITION PHASE ON THIS PROJECT AND CONNECT TO THE NEW ELECTRIC DUCT HEATING COIL VIA A DISCONNECT SWITCH. THE CONTRACTOR SHALL CONFIRM EXISTING WIRING/RACEWAY AND BREAKER MATCH THE REQUIRED RATINGS FOR THE NEW EQUIPMENT PRIOR TO RELEASE BEFORE THE START OF WORK.

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NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION

5.31.2028
Exp. Date

J. CHRIS MORRIS III, P.E.
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SHEET TITLE

ELECTRICAL FIRST FLOOR NEW WORK PLAN

DRAWING No.

SI-E 100.00

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1 ELECTRICAL ROOF NEW WORK PLAN

SCALE: 1/16" = 1'-0"

PROJECT NORTH

GENERAL NOTES

1. THE EXISTING CONDITIONS SHOWN ON THE CONTRACT DRAWINGS ARE BASED ON LIMITED FIELD SURVEY AND EXISTING DOCUMENTATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF DEMOLITION / NEW WORK AND PURCHASE OF NEW EQUIPMENT. SHOULD THERE BE A CONFLICT, THE CONTRACTOR SHALL ALERT THE ARCHITECT / ENGINEER IN WRITING.
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CONSULTANTS:

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ELECTRICAL ROOF NEW WORK PLAN

DRAWING No.

SI-E 101.00

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Somers Road

Asphalt Roadway

Double Yellow Stripe

Solid White Stripe

4' Chain Link Fence

Asphalt Curb

Concrete Curb

33 Regular Parking Spaces

4 Regular Parking Spaces

32 Regular Parking Spaces

Asphalt Walk

2 Parking Spaces

NEW INDUCTION LOOP (3 TURNS OF #14 AWG INDUCTION LOOP CABLE IN ROADWAY). RUN TO 1" CONDUIT AT EDGE OF ROADWAY TO NEW PULLBOX. SPLICE INDUCTION LOOP CABLE IN PULL BOX TO SHIELDED LEAD-IN WIRE AND RUN IN 1" CONDUIT TO EXISTING CONTROL BOX. (TYP. 3)

KEY PADS, CONTROL BOXES, AND GATE ARMS ARE EXISTING TO REMAIN.

NEW PULL BOX

Keypad

Security Gate Controls on Concrete

Gate Arm Motor

Gate Arm Motor

Key Pads

Control Boxes on Post

Gate Arm Motor

NEW PULL BOX

KEY PADS, CONTROL BOXES, AND GATE ARMS ARE EXISTING TO REMAIN.

NEW INDUCTION LOOP (3 TURNS OF #14 AWG INDUCTION LOOP CABLE IN ROADWAY). RUN TO 1" CONDUIT AT EDGE OF ROADWAY TO NEW PULLBOX. SPLICE INDUCTION LOOP CABLE IN PULL BOX TO SHIELDED LEAD-IN WIRE AND RUN IN 1" CONDUIT TO EXISTING CONTROL BOX. (TYP. 2)

White Chalk Stripe

Grass Field

Backstop

White Chalk Stripe

Basketball Hoop

Basketball Hoop

Concrete Bench

Concrete Pad

Concrete Bench

6' Chain Link Fence

Gate

Transformer on Concrete Pad

Vent Pipes

Fence Shed

Metal Ramp

Concrete Bench

Concrete Steps

Asphalt Walk

Gabion Wall

Brick Wall

Gabion Wall

Concrete Wall

Concrete Wall

Concrete Steps with Metal Hand Rail

Asphalt Curb

Concrete Curb

Concrete Curb

Asphalt Curb

Asphalt Curb

Concrete Curb

Asphalt Curb

Asphalt Curb

Asphalt

COPPER BRANCH CIRCUIT WIRE SIZING TABLES - 208V - 3% VOLTAGE DROP													
C/B TRIP		208V, 3P, 3W 120/208V, 3P, 4W			208V, 2P, 2W 120/208V, 2P, 3W				120V, 1P, 2W					
15	DISTANCE IN FEET	177	273	429	153	236	371	578	88	136	214	333	500	625
	MINIMUM WIRE SIZE	12	10	8	12	10	8	6	12	10	8	6	4	3
20	DISTANCE IN FEET	132	205	322	115	177	279	433	66	102	161	250	375	469
	MINIMUM WIRE SIZE	12	10	8	12	10	8	6	12	10	8	6	4	3
30	DISTANCE IN FEET	136	214	334	118	186	289	433	68	107	167	250	313	375
	MINIMUM WIRE SIZE	10	8	6	10	8	6	4	10	8	6	4	3	2
40	DISTANCE IN FEET	161	250	375	139	217	325	406	80	125	188	234	281	352
	MINIMUM WIRE SIZE	8	6	4	8	6	4	3	8	6	4	3	2	1
50	DISTANCE IN FEET	129	200	300	111	173	260	325	64	100	150	188	225	281
	MINIMUM WIRE SIZE	8	6	4	8	6	4	3	8	6	4	3	2	1
60	DISTANCE IN FEET	167	250	313	144	217	271	325	83	125	156	188	234	
	MINIMUM WIRE SIZE	6	4	3	6	4	3	2	6	4	3	2	1	
70	DISTANCE IN FEET	214	268	322	186	232	279	348	107	134	161	201		
	MINIMUM WIRE SIZE	4	3	2	4	3	2	1	4	3	2	1		
80	DISTANCE IN FEET	188	235	281	163	203	244	305	94	117	141	176		
	MINIMUM WIRE SIZE	4	3	2	4	3	2	1	4	3	2	1		
90	DISTANCE IN FEET	208	250	313	181	217	271		104	125	156			
	MINIMUM WIRE SIZE	3	2	1	3	2	1		3	2	1			
100	DISTANCE IN FEET	188	225	281	163	195	244		94	113	141			
	MINIMUM WIRE SIZE	3	2	1	3	2	1		3	2	1			

NOTES:

1. READ ACROSS TO THE RIGHT FROM C/B TRIP TO DESIRED VOLTAGE CHARACTERISTICS AND NEXT GREATER DISTANCE THAN CIRCUIT IN QUESTION.
2. READ DOWN TO MINIMUM WIRE SIZE.
3. DISTANCES ARE TO THE CENTER OF CONCENTRATED LOAD SUCH AS CLASSROOM LIGHTING OR THE MIDPOINT OF DISTRIBUTED LOAD SUCH AS CORRIDOR LIGHTING.
4. EQUIPMENT GROUNDING CONDUCTORS SHALL BE INCREASED IN SIZE PROPORTIONATELY PER N.E.C.

NOTES TO PANELBOARD SCHEDULES AND BRANCH CIRCUIT WIRE SIZING TABLES

WIRE SIZING

UNLESS OTHERWISE INDICATED, MINIMUM WIRE AMPACITY SHALL BE GREATER THAN OR EQUAL TO THE BRANCH CIRCUIT TRIP BASED ON COPPER CONDUCTOR WITH 90-DEGREE C THHN INSULATION APPLIED AT ITS 75-DEGREE C AMPACITY.

REFER TO THE BRANCH CIRCUIT WIRE SIZING TABLES FOR DISTANCE LIMITATIONS FOR THE MINIMUM WIRE SIZE AND FOR SELECTING THE PROPER WIRE SIZE FOR THE DISTANCE AND VOLTAGE DROP INVOLVED.

NUMBER OF CONDUCTORS

UNLESS OTHERWISE INDICATED, QUANTITIES OF WIRES SHALL BE BASED ON AN INDIVIDUAL HOMERUN FOR EACH CIRCUIT AS FOLLOWS.

	PHASE CONDUCTOR	FULL CIRCUIT SIZE NEUTRAL CONDUCTOR	FULL CIRCUIT SIZE EQUIPMENT GROUNDING CONDUCTOR	FULL CIRCUIT SIZE ISOLATED GROUND CONDUCTOR
1 POLE CIRCUIT	1	1	1	0
1 POLE DATA/ COMPUTER CIRCUIT	1	1	1	1
2 POLE CIRCUIT	2	1	1	0
3 POLE CIRCUIT	3	1	1	0
3 POLE MOTOR CIRCUIT DELTA	3	0	1	0
3 POLE MOTOR CIRCUIT WYE	3	1	1	0

CONSECUTIVE INDIVIDUAL 20 AMP LINE TO NEUTRAL BRANCH CIRCUITS MAY NOT BE COMBINED INTO MULTIWIRE BRANCH CIRCUITS HAVING HOMERUNS WITH A COMMON NEUTRAL CONDUCTOR.

SINGLE PHASE, TWO POLE, TWO WIRE, LINE TO LINE, BRANCH CIRCUITS AND SINGLE PHASE, TWO POLE, THREE WIRE, LINE TO LINE PLUS NEUTRAL, BRANCH CIRCUITS SHALL HAVE INDIVIDUAL UNCOMBINED HOMERUNS.

COMBINED TWO AND THREE CIRCUIT HOMERUNS SHALL HAVE SEPARATE NEUTRALS FOR EACH CIRCUIT BUT A COMMON EQUIPMENT GROUNDING CONDUCTOR AND A COMMON ISOLATED GROUNDING CONDUCTOR MAY BE USED.

	PHASE CONDUCTOR	FULL CIRCUIT SIZE NEUTRAL CONDUCTOR	FULL CIRCUIT SIZE EQUIPMENT GROUNDING CONDUCTOR	FULL CIRCUIT SIZE ISOLATED GROUND CONDUCTOR
TWO 1 POLE HOMERUNS	2	2	1	0
TWO 1 POLE DATA/COMP. CIRCUIT HOMERUNS	2	2	1	1
THREE 1 POLE HOMERUNS	3	3	1	0
THREE 1 POLE DATA/COMP. CIRCUIT HOMERUNS	3	3	1	1

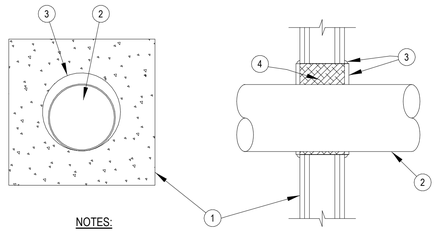
WIRE DERATING

1. COMBINED HOMERUNS SHALL HAVE THE MINIMUM BRANCH CIRCUIT WIRE SIZE INCREASED IN ACCORDANCE WITH CURRENT NATIONAL ELECTRICAL ADJUSTMENT FACTORS FOR NUMBER OF CURRENT CARRYING CONDUCTORS IN A RACEWAY.
2. NEUTRAL CONDUCTORS FOR FLUORESCENT AND HIGH INTENSITY DISCHARGE LIGHTING CIRCUITS ARE CURRENT CARRYING CONDUCTORS.
3. INDIVIDUAL NEUTRAL CONDUCTOR FOR COMBINED HOMERUNS FOR DATA / COMPUTER OUTLETS ARE CURRENT CARRYING CONDUCTORS.
4. NEUTRAL CONDUCTORS FOR DIMMING CIRCUITS ARE CURRENT CARRYING CONDUCTORS.

RACEWAY SIZING

1. ALL RACEWAYS SHALL BE SIZED IN ACCORDANCE WITH THE CURRENT NATIONAL ELECTRICAL CODE IN EFFECT AS A MINIMUM SIZE. THE MORE COMMON SIZES ARE INCLUDED HERE FOR THE CONTRACTOR'S CONVENIENCE.

WIRE SIZE	NO. OF CONDUCTORS	MINIMUM CONDUIT SIZE	WIRE SIZE	NO. OF CONDUCTORS	MINIMUM CONDUIT SIZE
12	3	3/4"	8	3	3/4"
12	4	3/4"	8	4	3/4"
12	5	3/4"	8	5	3/4"
12	6	3/4"	8	6	1"
12	7	3/4"	8	7	1"
12	8	3/4"	8	8	1"
10	3	3/4"	6	3	3/4"
10	4	3/4"	6	4	3/4"
10	5	3/4"	6	5	1"
10	6	3/4"	6	6	1"
10	7	3/4"	6	7	1-1/4"
10	8	3/4"	6	8	1-1/4"

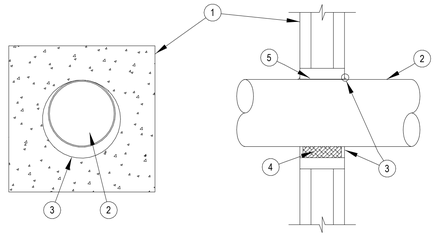


NOTES:

1. RATED GYPSUM WALL BOARD ASSEMBLY.
2. MAXIMUM 10" TRADE SIZE STEEL CONDUIT OR EMT.
3. STI SPECSEAL SERIES 100 SEALANT INSTALLED TO A 1/2" DEPTH FLUSH TO THE END OF THE SLEEVE WITH AN ADDITIONAL 1/4" CROWN APPLIED AROUND THE SLEEVE / WALL INTERFACE. ANNULUS RANGING FROM 1/8" MINIMUM TO 2 1/4" MAXIMUM.
4. STEEL SLEEVE PACKED WITH MINERAL WOOL BATT, TO FULL THICKNESS RECESSED FROM BOTH SIDES TO ACCOMMODATE FILL MATERIAL.

1 OR 2 HOUR RATED FIRESTOP FOR METALLIC CONDUIT THRU GYPSUM BOARD WALLS

1 SCALE:NONE U.L. SYSTEM NUMBER W-L-1054



NOTES:

1. CONCRETE SLAB OR CONCRETE OVER STEEL DECK.
2. MAXIMUM 8" TRADE SIZE STEEL CONDUIT. ANNULUS RANGING FROM POINT CONTACT" TO 1.4" MAXIMUM.
3. STI SPECSEAL SERIES 100 SEALANT INSTALLED TO A 1/2" DEPTH. **
4. MINERAL WOOL BATT, NOMINAL 4PCF. TO FULL THICKNESS RECESSED FROM BOTH SIDES TO ACCOMMODATE FILL MATERIAL.
5. STEEL SLEEVE.

*NOTE: A MINIMUM ANNULAR SPACE OF 1/4" AND A 28 GAUGE STEEL COVER PLATE ARE REQUIRED FOR A 4 HOUR RATING.

**NOTE: AT POINT CONTACT APPLY A 3/8" COVE BEAD OF SEALANT BETWEEN PIPE AND BOTH SURFACES OF WALL.

2 HOUR RATED FIRESTOP FOR METALLIC CONDUIT THRU MASONRY WALLS

2 SCALE:NONE U.L. SYSTEM NUMBER C-AJ-1150

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SOMERS CENTRAL SCHOOL DISTRICT

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240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

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ELECTRICAL CONSTRUCTION

STATUS

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SHEET TITLE

ELECTRICAL DETAILS

DRAWING No.

SI-E 500.00

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FIRE ALARM LEGEND

SYMBOL	DESCRIPTION	COMMENTS
FACP	FIRE ALARM CONTROL PANEL.	
RA	REMOTE ANNUNCIATOR WITH BACKBOX.	
S	SMOKE DETECTOR.	
S	SMOKE ALARM. SMOKE ALARMS SHALL BE EQUIPPED WITH 10-YEAR BATTERY BACKUP, VISUAL INDICATOR AND LOCAL SOUNDER BASE (520 MHZ, LOW FREQUENCY).	
S CO	COMBINATION SMOKE/CARBON MONOXIDE ALARM. ALARMS SHALL BE EQUIPPED WITH 10-YEAR BATTERY BACKUP, VISUAL INDICATOR, AND LOCAL SOUNDER BASE (520 MHZ, LOW FREQUENCY).	
RAL S	ABOVE CEILING SMOKE DETECTOR WITH REMOTE ALARM LAMP.	
RAL S CM S/R	DUCT DETECTOR WITH REMOTE ALARM LAMP; "S" DENOTES SUPPLY, "R" DENOTES RETURN. PROVIDE WEATHERPROOF ENCLOSURE WHERE DETECTOR CANNOT BE INSTALLED INSIDE BUILDING. PROVIDE 120V FEED FOR WEATHERPROOF ENCLOSURE FROM NEAREST CONVENIENCE OUTLET POWER FEED.	
RAL S CM	DUCT SMOKE DETECTOR WITH REMOTE ALARM LAMP AND CONTROL MODULE FOR FIRE SMOKE DAMPERS.	
I	HEAT DETECTOR.	
I F	HEAT DETECTOR 200°.	
CO	CARBON MONOXIDE DETECTOR.	
MH	ADDRESSABLE MINI HORN (520 MHZ, LOW FREQUENCY).	
	HORN/STROBE COMBO.	
	SPEAKER/STROBE COMBINATION	
WP	WEATHER PROOF HORN/STORBE COMBO WITH BACKBOX.	
AM	ADAPTER MODULE WITH MOUNTING PLATE.	
SH	SMOKE HATCH (F.B.O.).	
	STROBE.	
DH	MAGNETIC DOOR HOLDER.	
F	MANUAL PULL STATION WITH BACKBOX.	
CM	CONTROL MODULE (ADDRESSABLE RELAY).	
IAM	INDIVIDUAL ADDRESSABLE MODULE.	
AES	AUTOMATIC EXTINGUISHING SYSTEM.	
	MOTOR STARTER.	
R	END OF LINE RESISTOR.	
BT	BEAM DETECTOR TRANSMITTER.	
BR	BEAM DETECTOR RECEIVER.	
SP	SURGE PROTECTOR.	
S EL	SMOKE DETECTOR FOR ELEVATOR RECALL.	
SRP	SUPPRESSION RELEASING PANEL.	
MS	MAINTENANCE SWITCH.	
SOL	SOLENOID (F.B.O.).	
PS	PRESSURE SWITCH.	
TS	TAMPER SWITCH	
FS	FLOW SWITCH	
CS	COIL SUPERVISORY (F.B.O.).	
B	SPRINKLER ALARM BELL.	

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SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

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ELECTRICAL
FIRE ALARM LEGENDS

DRAWING No.

SI-FA 001.00

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GENERAL NOTES

1. REFER TO DRAWING SI-FA 001 FOR FIRE ALARM LEGENDS.
2. REFER TO DRAWINGS SI-FAD 100 AND 101 FOR FIRE ALARM DEMOLITION DRAWINGS.
3. REFER TO DRAWINGS SI- FA 100 AND 101 FOR FIRE ALARM NEW WORK DRAWINGS.
4. REFER TO DRAWING SI-FA 500 FOR FIRE ALARM RISER AND NOTES.

FIRE ALARM DEMOLITION NOTES

1. EXISTING FIRE ALARM CONTROL PANELS, REMOTE POWER SUPPLIES, ANNUNCIATORS, AND SYSTEM DEVICES INCLUDING (PULL STATIONS, SMOKE DETECTORS, DUCT SMOKE DETECTORS, HEAT DETECTORS, CO DETECTORS, MONITOR MODULES, CONTROL MODULES AND NOTIFICATION APPLIANCES) TO BE DISCONNECTED AND REMOVED IN THEIR ENTIRELY AFTER NEW FIRE ALARM SYSTEM HAS BEEN INSTALLED, TESTED AND ACCEPTED BY THE LOCAL FIRE MARSHAL, OWNER AND ENGINEER.
2. ALL FIRE ALARM DEVICES SHOWN HATCHED ON THIS DEMOLITION PLAN ARE EXISTING TO BE REMOVED WITH ASSOCIATED CONDUIT AND WIRING BACK TO THEIR SOURCE.
3. CONTRACTOR IS RESPONSIBLE TO PATCH AND PAINT ALL OPENINGS AS A RESULT OF REMOVAL OF EXISTING EQUIPMENT.
4. CONTRACTOR SHALL REPLACE ALL CEILING TILES WHERE FIRE ALARM DEVICES WERE REMOVED.

1 **FIRST FLOOR FIRE ALARM DEMOLITION PLAN**
SCALE: 1/16" = 1'-0"

PROJECT NORTH

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Exp. Date

J. CHRIS MORRIS III, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 101354

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S. FREEMAN	W. TESTA	S. SOUSSOU	C. MORRIS

PROJECT No:	DATE:	SCALE:
SMSD2506	JULY 2026	AS SHOWN

CLIENT

SOMERS CENTRAL SCHOOL DISTRICT

VARIOUS UPGRADES AT SOMERS INTERMEDIATE SCHOOL

240 US-202
SOMERS, NY 10589

SED #: 66-21-01-06-0-006-021

CONTRACT

CONTRACT E
ELECTRICAL CONSTRUCTION

STATUS

SED SUBMISSION

SHEET TITLE

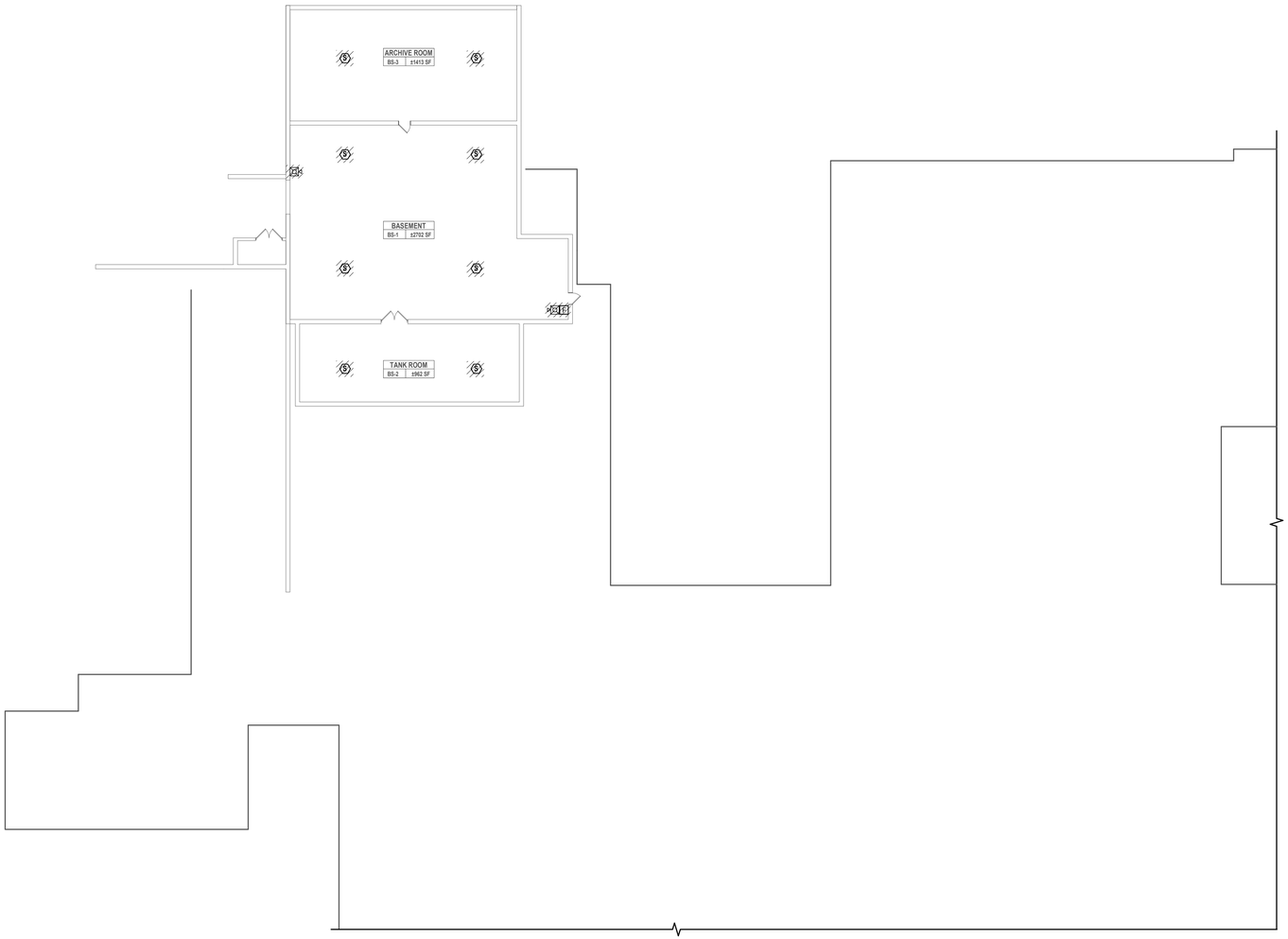
ELECTRICAL
FIRST FLOOR FIRE ALARM DEMOLITION PLAN

DRAWING No.

SI-FAD 100.00

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GENERAL NOTES

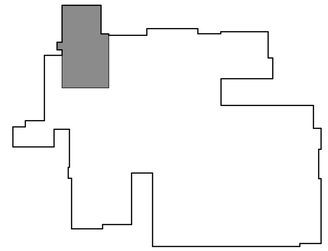
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2. REFER TO DRAWINGS SI-FAD 100 AND 101 FOR FIRE ALARM DEMOLITION DRAWINGS.
3. REFER TO DRAWINGS SI- FA 100 AND 101 FOR FIRE ALARM NEW WORK DRAWINGS.
4. REFER TO DRAWING SI-FA 500 FOR FIRE ALARM RISER AND NOTES.

FIRE ALARM DEMOLITION NOTES

1. EXISTING FIRE ALARM CONTROL PANELS, REMOTE POWER SUPPLIES, ANNUNCIATORS, AND SYSTEM DEVICES INCLUDING (PULL STATIONS, SMOKE DETECTORS, DUCT SMOKE DETECTORS, HEAT DETECTORS, CO DETECTORS, MONITOR MODULES, CONTROL MODULES AND NOTIFICATION APPLIANCES) TO BE DISCONNECTED AND REMOVED IN THEIR ENTIRELY AFTER NEW FIRE ALARM SYSTEM HAS BEEN INSTALLED, TESTED AND ACCEPTED BY THE LOCAL FIRE MARSHAL, OWNER AND ENGINEER.
2. ALL FIRE ALARM DEVICES SHOWN HATCHED ON THIS DEMOLITION PLAN ARE EXISTING TO BE REMOVED WITH ASSOCIATED CONDUIT AND WIRING BACK TO THEIR SOURCE.
3. CONTRACTOR IS RESPONSIBLE TO PATCH AND PAINT ALL OPENINGS AS A RESULT OF REMOVAL OF EXISTING EQUIPMENT.
4. CONTRACTOR SHALL REPLACE ALL CEILING TILES WHERE FIRE ALARM DEVICES WERE REMOVED.

1 **BASEMENT FIRE ALARM DEMOLITION PLAN**
SCALE: 1/16" = 1'-0"

PROJECT NORTH



KEY PLAN - BASEMENT
SCALE: 1" = 100'-0"

PROJECT NORTH

H2M architects + engineers
1133 Westchester Avenue, Suite N-210
White Plains, NY 10605
914.358.5623 • www.h2m.com
NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No.: 0018178

CONSULTANTS:

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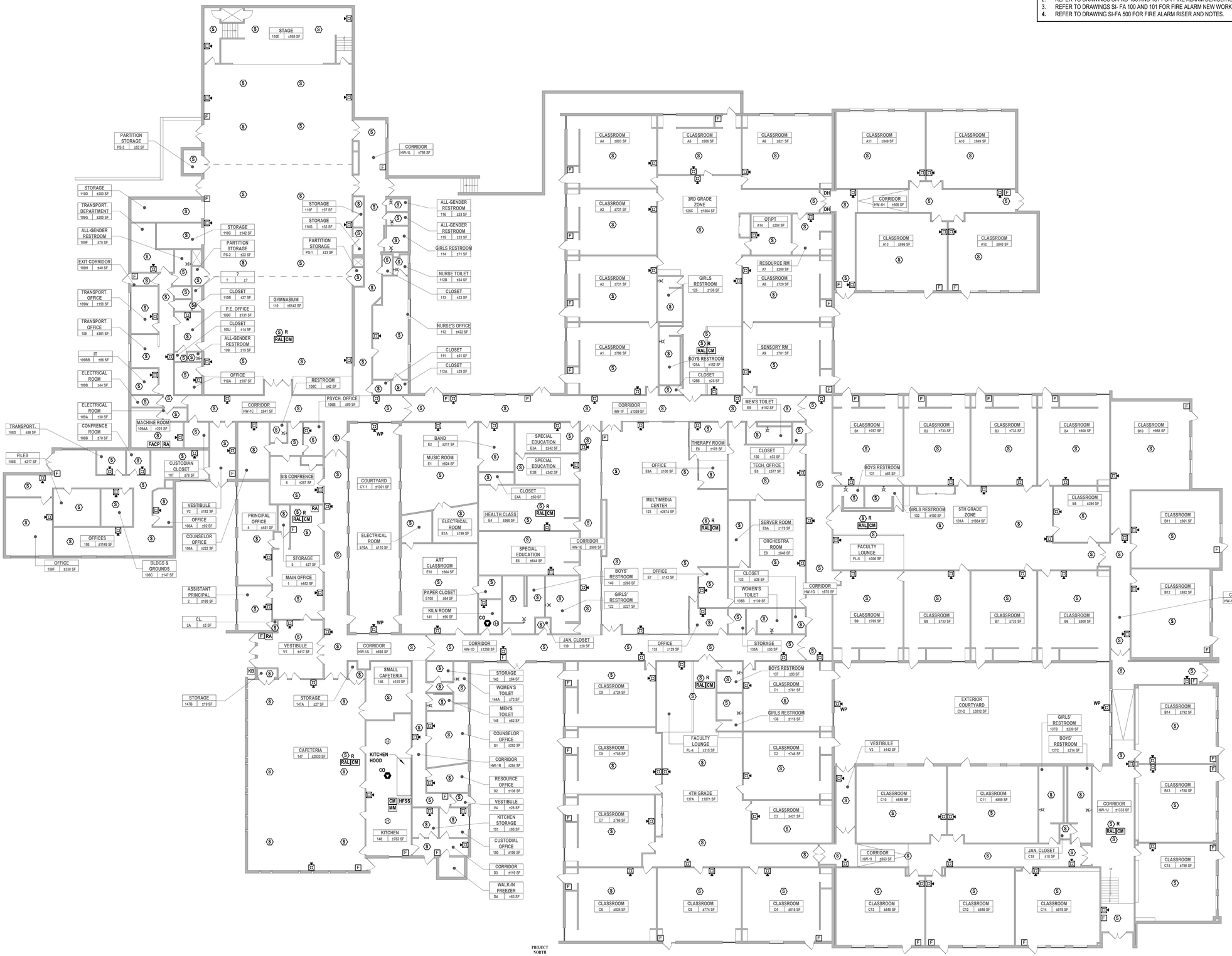
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1 FIRST FLOOR FIRE ALARM NEW WORK PLAN
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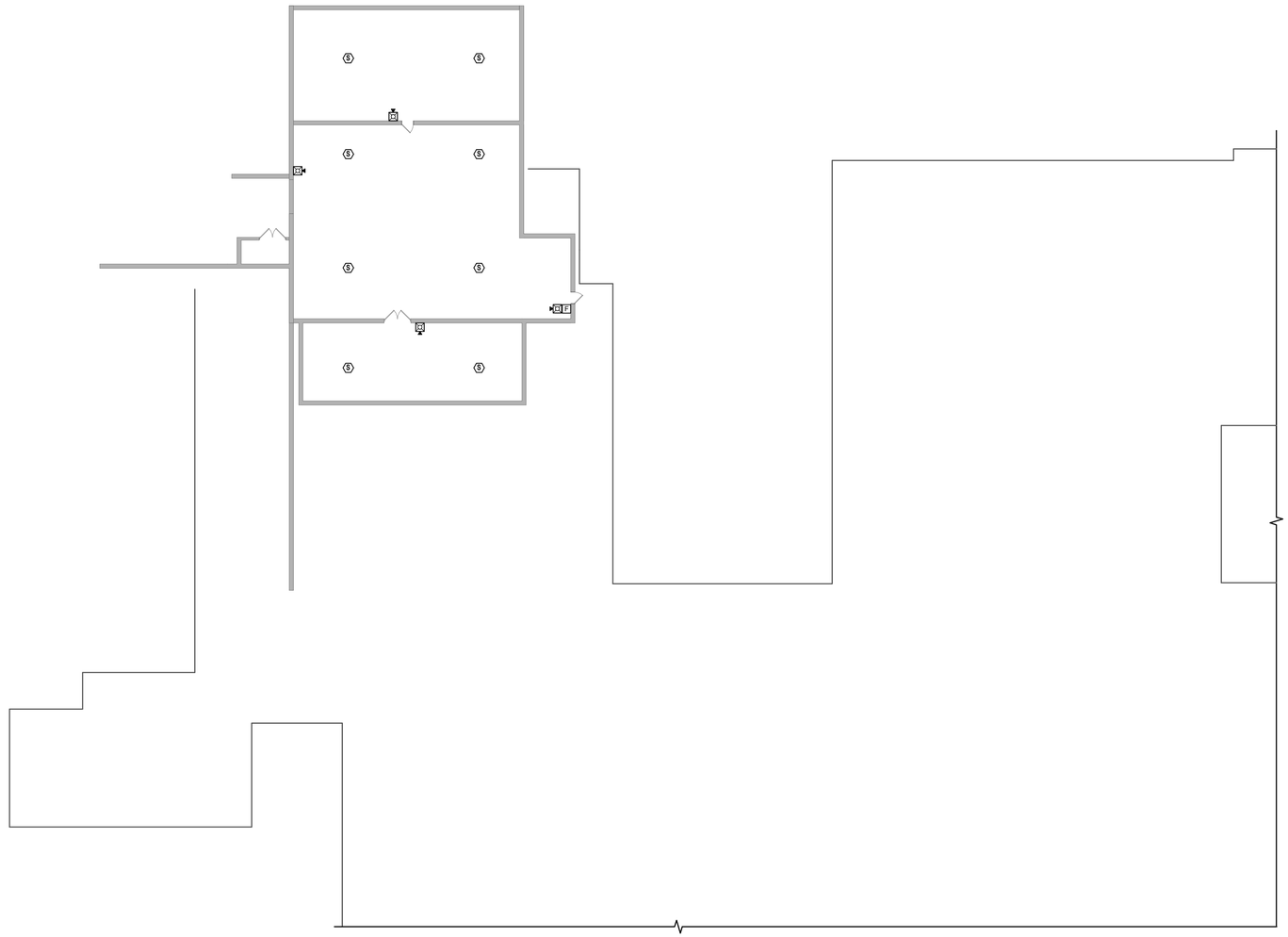
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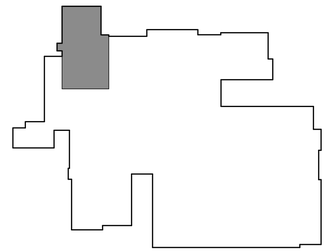


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PROJECT NORTH

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PROJECT NORTH

KEY PLAN - BASEMENT
SCALE: 1" = 100'-0"

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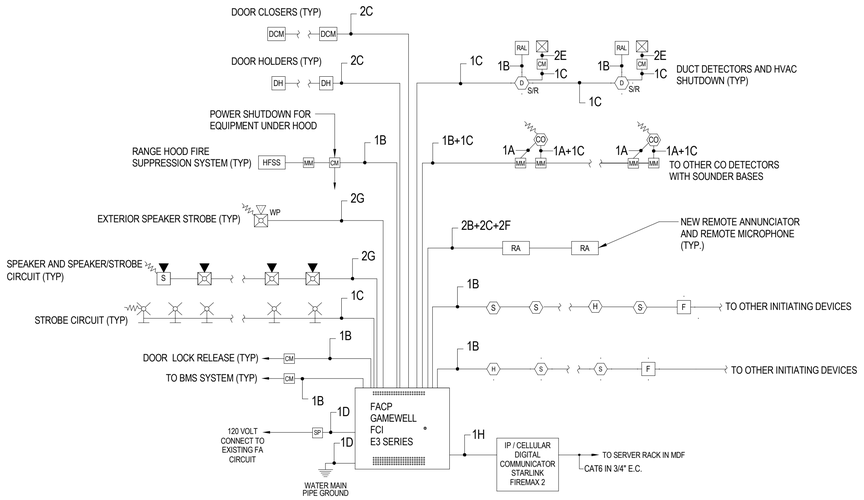
ELECTRICAL BASEMENT FIRE ALARM NEW WORK PLAN

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1 Fire Alarm Riser Diagram (Note #22)

SCALE:NOT TO SCALE

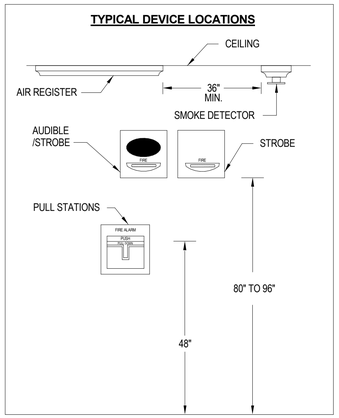
WIRE LEGEND

	WIRE DESCRIPTION	TYPE	NOTES
A	1 PAIR TWISTED SHIELDED #18	FPLP	-
B	1 PAIR #18 AWG. NON SHIELDED	FPLP	-
C	1 PAIR #14 AWG. NON SHIELDED	FPLP	-
D	#12 AWG. NON SHIELDED	THHN	1
E	#14 AWG. NON SHIELDED	THHN	-
F	1 PAIR TWISTED SHIELDED #16	FPLP	-
G	1 PAIR TWISTED SHIELDED #14	FPLP	-
H	MANUFACTURER RECOMMENDED CABLE	-	-

NOTES:

1. PROVIDE ALL 120 VOLT CIRCUITS IN CONDUIT.

TYPICAL DEVICE LOCATIONS



2 Fire Alarm Device Mounting Height Detail

SCALE:NOT TO SCALE

NOTES:

1. ALL WIRING TO BE INSTALLED ACCORDING TO THE LATEST REVISION OF THE NATIONAL ELECTRIC CODE OR AS DICTATED BY CONTRACT SPECIFICATIONS, AND THE 2022 EDITION OF N.F.P.A 72 OR AS REQUIRED BY LOCAL ORDINANCE.
2. ALL CONDUCTORS MUST BE TEST FREE OF OPENS, SHORTS AND GROUNDS.
3. GROUNDING MUST COMPLY WITH THE NATIONAL ELECTRIC CODE. GROUNDING MUST BE No. 12 A.W.G.
4. ALL PANEL TERMINATIONS TO BE SUPERVISED BY A FACTORY AUTHORIZED TECHNICIAN PRIOR TO POWERING EQUIPMENT.
5. FOR COMPONENT WIRING AND INSTALLATION INFORMATION REFER TO MANUFACTURERS REQUIREMENTS.
6. REFER TO CONTRACT DRAWINGS FOR APPROXIMATE DEVICE LOCATIONS. DRAWINGS REPRESENT DEVICE QUANTITIES. SHOP DRAWINGS SHALL BE SUBMITTED SHOWING SCALED LOCATIONS. CONTRACTOR TO SUBMIT PLANS STAMPED BY LICENSED NEW YORK PROFESSIONAL ENGINEER ONLY. SHOP DRAWINGS WITHOUT P.E. STAMP WILL BE AUTOMATICALLY REJECTED.
7. EXISTING FIRE ALARM SYSTEM INCLUDING ALL DEVICES TO BE DISCONNECTED AND REMOVED IN ITS ENTIRETY AFTER NEW FIRE ALARM HAS BEEN TESTED AND ACCEPTED BY LOCAL FIRE MARSHALL, OWNER AND ENGINEER ALL EQUIPMENT, CONDUIT AND WIRING TO BE REMOVED FROM DEVICE BACK TO THEIR ORIGINAL SOURCE.
8. CONTRACTOR RESPONSIBLE TO PATCH & PAINT ALL OPENINGS AS A RESULT OF REMOVAL OF EXISTING EQUIPMENT.
9. INSTALL DETECTORS A MINIMUM OF 3'-0" FROM ANY SUPPLY OR RETURN AIR REGISTERS.
10. WHEN INSTALLING SHIELDED CABLE THE FOLLOWING MUST BE OBSERVED:
    A. METALLIC CONTINUITY MUST BE MAINTAINED THROUGHOUT THE CABLE RUN.
    B. THE CABLE SHIELD MUST BE ISOLATED FROM GROUND AND TERMINATED ONLY IN THE ASSOCIATED CONTROL PANEL AT THE TERMINAL INDICATED ON THE CONTROL PANEL DRAWINGS. THE REMOTE END OF THE SHIELD (AT LAST DEVICE) MUST BE TAPED AND ISOLATED FROM GROUND.
11. ALL STROBE APPLIANCES SHALL BE SYNCHRONIZED. ALL ALARM INDICATING APPLIANCES (SPEAKERS) SHALL SOUND A 'TEMPORAL 3' CODE PATTERN FOR SMOKE ALARM AND A 'TEMPORAL 4' CODE PATTERN FOR CO ALARM.
12. AFTER ALARM INDICATION, ALL FANS SHALL BE MANUALLY RESET INDEPENDENT FROM F.A.C.P. SYSTEM RESET. PROVIDE ALL REQUIRED HARDWARE ACCESSORIES, MOTOR STARTERS, CONTROLS, POWER AND CONTROL WIRING AND CONDUITS TO PROVIDE INDEPENDENT RESET OF ALL FANS AFTER ALARM INDICATION.
13. INSTALL ALL DEVICES IN ACCORDANCE WITH A.D.A REQUIREMENTS. ALL DEVICES SHALL BE MOUNTED AS FOLLOWS:
    A. - MANUAL PULL STATIONS 48" O.C. TO HANDLE
    B. - ALARM INDICATING APPLIANCE 80" A.F.F.
    C. - VERIFY WITH CONTRACT SPECIFICATIONS FOR ANY DEVIATIONS.
14. ALL STROBES SHALL BE WIRED TO REMAIN ACTIVE AFTER SPEAKERS ARE SILENCED. STROBES SHALL REMAIN ACTIVE UNTIL ALARM IS RESOLVED.
15. PROVIDE AND INSTALL ALL NECESSARY CONTROL (RELAY) MODULES, SYNCHRONIZATION MODULES, ISOLATION MODUELS AND MONITOR MODULES AS REQUIRED BY MANUFACTURER.
16. CONTRACTOR TO INSTALL NECESSARY & REQUIRED POWER SUPPLY UNITS TO ENSURE PROPER OPERATION AT ALL MAGNETIC DOOR HOLDERS, CO DETECTOR, ETC. AS SHOWN ON DRAWINGS OR REQUIRED BY THE MANUFACTURER.
17. PROVIDE AND INSTALL ALL REQUIRED RELAYS TO RELEASE ELECTRIC DOOR LATCHES.
18. COORDINATE EXACT LOCATION OF REMOTE ANNUNCIATOR AND F.A.C.P. WITH AHJ AND OWNER.
19. PROVIDE ALL REQUIRED DUCT SMOKE DETECTORS. CONTRACTOR TO INSTALL DUCT SMOKE DETECTORS. CONTRACTOR TO INTERFACE ALL DUCT DETECTORS WITH FACP.
20. CONTRACTOR SHALL PROVIDE ALL COMMUNICATION WIRING FOR EACH FACP. PROVIDE ALL REQUIRED WIRING/CONDUIT TO LOCATE COMMUNICATIONS IN FACP. PROVIDE CAT 6 CABLE AND DATA JACKS AS REQUIRED.
21. FIRE ALARM RISER DIAGRAM IS SCHEMATIC. REFER TO FLOOR PLANS FOR DEVICE TYPES AND QUANTITIES.
22. PROTECTIVE SHIELDS (STOPPER II) SHALL BE PROVIDED FOR ALL PULL STATIONS. SHIELDS SHALL FIT OVER MANUAL PULL STATIONS AND SHALL INCLUDE A BATTERY OPERATED PIERCING HORN WHEN THE SHIELD IS OPENED.
23. PLENUM WIRING TO BE USED IN ALL AREAS. CONDUIT MUST BE USED IN ALL MECHANICAL ROOMS, ELECTRICAL ROOMS AND AREAS WITH OPEN CEILINGS.
24. ALL EQUIPMENT TO BE SURFACE MOUNTED ON MASONRY WALLS WITH WIRING RUN IN METAL SURFACE RACEWAY IN FINISHED AREAS.
25. ALL EQUIPMENT TO BE RECESSED MOUNTED ON DRYWALL WALLS WITH WIRING RUN CONCEALED.
26. ALL EQUIPMENT TO BE SURFACE MOUNTED ON MASONRY WALLS AND CEILINGS WITH WIRING RUN IN EMT CONDUIT IN UNFINISHED (BOILER ROOMS, STORAGE ROOMS ETC.) AREAS.
27. ALL EQUIPMENT MOUNTED ON THE ROOF AND EXTERIOR OF THE BUILDING TO HAVE WIRING RUN IN RMC CONDUIT.
28. ALL HVAC EQUIPMENT WITH A CFM RATING OF 1000 CFM OR GREATER SHALL BE INTERCONNECTED TO THE FIRE ALARM SYSTEM AND SHUT DOWN UPON FIRE ALARM SYSTEM ALARM ACTIVATION. CONTRACTOR SHALL ALSO PROVIDE AND INSTALL NEW SUPPLY AND RETURN DUCT SMOKE DETECTORS WITH REMOTE LED'S FOR ALL HVAC UNITS WITH A CFM RATING OF 2000 CFM OR GREATER. CONTRACTOR SHALL INTERFACE WITH ALL EXISTING STARTERS AND PROVIDE NEW STARTERS WHERE REQUIRED.
29. ISOLATION MODULES SHALL BE INSTALLED TO LIMIT THE NUMBER OF FIRE ALARM DEVICES ON A CIRCUIT PER THE CODE.
30. FIRE ALARM SYSTEM SHALL HAVE 20% SPACE CAPACITY TO ALLOW FOR ADDITIONAL DEVICES.
31. FIRE ALARM SYSTEM SHALL HAVE BATTERY BACKUP CAPACITY TO PROVIDE 24 HOURS OF STANDBY AND 15 MINUTES OF ALARM.
32. FURNISH AND INSTALL PROTECTIVE GUARDS FOR ALL NEW FIRE ALARM DEVICES IN THE GYM.
33. CONTRACTOR SHALL REPLACE CEILING TILES (MATCH EXISTING) WHERE EXISTING FIRE ALARM DEVICES ARE REMOVED.
34. THE BRANCH CIRCUIT SUPPLYING THE FIRE ALARM EQUIPMENT(S) SHALL SUPPLY NO OTHER LOADS. THE LOCATION OF THE BRANCH-CIRCUIT OVERCURRENT PROTECTIVE DEVICE SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM CONTROL UNIT. THE CIRCUIT DISCONNECTING MEANS SHALL HAVE RED IDENTIFICATION, SHALL BE ACCESSIBLE ONLY TO QUALIFIED PERSONNEL, AND SHALL BE IDENTIFIED AS "FIRE ALARM CIRCUIT." THE RED IDENTIFICATION SHALL NOT DAMAGE THE OVERCURRENT PROTECTIVE DEVICES OR OBSCURE THE MANUFACTURER'S MARKINGS. THE FIRE ALARM BRANCH-CIRCUIT DISCONNECTING MEANS SHALL BE PERMITTED TO BE SECURED IN THE "ON" POSITION.
35. CONTRACTOR SHALL FURNISH AND INSTALL A 18" X 24" FRAMED FLOOR PLAN OF THE SCHOOL WITH FA DEVICES INDICATED AT THE FACP AND REMOTE ANNUNCIATOR LOCATIONS.
36. CONTRACTOR TO INCLUDE THE FOLLOWING FA DEVICES WITH 30' OF CONDUIT AND WIRING INSTALLED IN THE BID. IF NOT USED, THE DEVICES SHALL BE TURNED OVER TO THE OWNER FOR "ATTIC STOCK"
    (5) PULL STATION)
    (10) SMOKE DETECTORS
    (5) HEAT DETECTORS
    (10) SPEAKER / STROBES)
    (5) STROBES
    (4) DUCT DETECTORS W/ REMOTE TEST STATIONS
    (5) MONITOR MODULES
    (5) CONTROL MODULES
    (6) ELECTROMAGNETIC DOOR HOLDERS

	CONTROL UNIT & ANNUNCIATOR						NOTIFICATION				SUPPLEMENTARY						
	ACTUATE COMMON ALARM SIGNAL INDICATOR	ACTUATE VISUAL ALARM SIGNALS	ACTUATE COMMON SUPERVISORY SIGNAL INDICATOR	ACTUATE COMMON TROUBLE SIGNAL	DISPLAY DEVICE TYPE AND LOCATION	ACTUATE FULL BUILDING EVACUATION SIGNALS	DISPLAY CHANGE OF STATUS	TRANSMIT FIRE ALARM SIGNAL TO SUPERVISING STATION	TRANSMIT SUPERVISION SIGNAL TO SUPERVISING STATION	TRANSMIT TROUBLE SIGNAL TO SUPERVISING STATION	ACTIVATE CO DETECTOR SOUNDER BASE	HVAC UNIT SHUTDOWN	INITIATE EXTERIOR STROBE	RELEASE MAG. DOOR HOLDERS	RELEASE ELECTRIC DOOR LOCKS		
MANUAL PULL STATION	●	●			●	●	●	●					●	●	●		
SMOKE DETECTOR	●	●			●	●	●	●					●	●	●		
HEAT DETECTOR	●	●			●	●	●	●					●	●	●		
DUCT DETECTOR			●		●		●		●		●						
CARBON MONOXIDE DETECTOR			●		●		●		●			●					
FIRE PANEL AC POWER FAILURE				●			●			●							
FA SYSTEM LOW BATTERY				●			●			●							
OPEN CIRCUIT				●			●			●							
GROUND FAULT				●			●			●							
NOTIFICATION APPLIANCE CIRCUIT SHORT				●			●			●							
RANGE HOOD FIRE SUPPRESSION SYSTEM	●	●			●	●	●	●					●	●	●		

3 Fire Alarm Sequence of Operation

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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. Disconnecting, capping or sealing, and abandoning in-place or removing site utitilities.
   4. Salvage of existing items to be reused or recycled.
   5. Recovery of Refrigerant materials.
   6. Identification of utilities.

B. Related Requirements:
   1. Section 011100 - SUMMARY OF WORK and Section 011400 - WORK RESTRICTIONS for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements for each School.
   2. Section 020100 - Maintenance of Existing Conditions.
   3. Section 311000 for site clearing and removal of above and below-grade improvements.
   4. Section 230015 - Mechanical Demolition.
   5. Section 260010 - Electrical Demolition.

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, store, 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.

E. LEAD-SAFE working practices - an EPA term defining Contractor required procedures for containing work areas, minimizing dust and cleaning up when working with possible lead paint during construction projects.

1.04 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.05 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at each Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure, if applicable.
   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 refrigerants, stating that all refrigerants that w 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 waste 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 REGULATORY REQUIREMENTS

A. Comply with governing EPA and NYSDEC notification regulations before beginning Selective Demolition.

B. Conform to applicable state and local codes for demolition of structures, safety of adjacent structures, dust control, runoff control, disposal and utility removal and cap offs.

C. Obtain required permits from Regulatory and Governing Authorities.

D. Notify affected utility companies before starting Work and comply with their requirements.

E. Do not close or obstruct roadways, sidewalks or adjacent utilities without approval by authorities having jurisdiction and Architect.

F. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials. Hazardous and/or contaminated material removal are not the responsibility of this Contractor except where noted. Removal of all refrigerant from air conditioning and other cooling equipment is part of this contract for such equipment scheduled to be removed. Removal of light fixtures where indicated is part of this Contract.

1.10 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. Assume all existing paint is lead base paint. Employ lead safe working practices when cutting, removing, and/or disturbing existing painted materials. EPA LEAD-SAFE working practices: http://www.epa.gov/lead/pubs/renovation.htm. See also OSHA 29 CFR Section 1926.62(a).

E. 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.

F. Storage or sale of removed items or materials on-site is not permitted.

G. 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 Owner, Construction Manager, and Architect.

1.11 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. 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 buildings 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.
   1. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerants, stating that all refrigerants that were present was recovered and that recovery was performed according to EPA regulations and other authorities having jurisdiction regulations. Include name and address of technician and date(s) refrigerant was recovered.

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. Septic and/or holding tanks shall be pumped out by a licensed professional septic system contractor. Metal tanks shall be removed and disposed of in accordance with authorities having

jurisdiction. Backfill tank excavations with select granular fill. Concrete tanks, distribution boxes and drywells if outside the new structure footprint and pavement areas may be crushed (after pumping) and compacted in place or filled with lean concrete unless prohibited by local codes. Concrete septic tanks, drywells and distribution boxes within the new structure footprint and/or pavement areas shall be removed, backfilled in lifts and compacted with select granular fill.

B. 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.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

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. Refer to construction drawings.
   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 SPECIAL JOB CONDITIONS

A. Any special job conditions, including variances to be obtained by the Contractor, are described herein.
   1. The contractor shall be responsible for obtaining any site specific variances.

1.03 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.
   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.

1.04 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

1.05 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.

1.06 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.

1.07 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).

1.08 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.

1.09 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.

1.10 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.

1.11 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.

1.12 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.

1.13 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.
   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

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PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Related Sections:
   1. Section 022600 - HAZARDOUS MATERIALS ASSESSMENT.

B. This lead-based paint and material removal project will consist of the localized removal of loose and/or damaged lead based paint in the areas indicated in the report attached herewith.

C. The work shall include, but not be limited to removal and disposal of the following:
   1. All positive lead containing materials greater than regulatory level of 1.0 described in the lead paint inspection report attached within Specification Section 022600 - HAZARDOUS MATERIALS ASSESSMENT.

D. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.

E. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.

F. Refer to SSPC C3/5 requirements, when applicable, when removing lead on commercial buildings and superstructures including on all steel where impact is not incidental and activities include but are not limited to; abrasive blasting, water jetting, power tool usage, and other large dust producing remedial activities.

1.02 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. The Contractor must maintain current licenses pursuant to New York State Department of Labor, Department of Environmental Conservation and Environmental Protection Agency for all Work related to this Project, including the removal, handling, transport, and disposal of lead containing materials.

C. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in or supervise Work on any lead Project have prior experience on similar projects. If in the course of the project there should be materials or surfaces that contain asbestos, the contractor and all workers must be certified by the NYS Department of Labor as handlers and contractor/supervisors. It is then the responsibility of the contractor to also follow the asbestos specification for this project.

D. 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 shall defend all suits or claims for infringement of any patent rights and save the Owner, Architect, Engineer, Environmental Consultant, and Construction Manager harmless from loss, including attorney's fees, on account thereof.

E. Failure to adhere to the Project 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 SUBMITTALS

A. Pre-contract Submittals: Within 3 days after bids are opened, the three apparent low bidders shall submit the following documentation. Failure to submit all required documentation truthfully or in a timely manner may be cause for rejection of the bid.
   1. Contractor certifications issued by the Environmental Protection Agency.

2. The number of years engaged in lead-based paint renovation and remolding projections.
3. 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, contact persons, address, and phone number.
4. A list of owned equipment available to be used in the performance of the Project.
5. An outline of the Worker training course and medical surveillance program conducted by the Contractor.
6. A standard operating procedures manual describing Work practices and procedures, equipment, type of decontamination facilities, respiratory program, special removal techniques, etc.
7. 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 lead contracts. Briefly describe the circumstances citing the Project and involved persons and agencies as well as the outcome of any actions.
   b. Any Stop Work Orders issued on Projects within the past 2 years.
   c. Any litigation or arbitration proceedings arising out of performance on past Projects.
   d. Any liquidated damages assessed within the last 2 years.
8. 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: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below:
   1. Progress Schedule:
      a. Show the complete sequence of lead related activities and the sequencing of Work within each 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 or phase.
      c. Show projected percentage of completion for each item, as of the first day of each month.
      d. Show final inspection dates.
   2. Permits: As required by State and local regulations, including arrangements for storage, transportation, and disposal of contaminated material.
   3. Lead Activities Work Plan: Provide plans which clearly indicate the following:
      a. All Work Areas/containment's numbered sequentially.
      b. Locations and types of all decontamination enclosures.
      c. Entrances and exits to the Work Areas/containment's.
      d. Type of lead related activity/technique for each Work Area/containment.
      e. Proposed location and construction of storage facilities and field office.
      f. Location of water and electrical connections to building services.
   4. Equipment: Submit manufacturer's data sheets/product descriptions of all equipment and products including HEPA vacuums, respirators, protective clothing, chemicals, etc. identified in this specification.
   5. Samples: Submit samples of warning notices to be posted, replacement materials, etc.
   6. Worker Training, Medical Surveillance, and Certification:
      a. The Contractor shall submit a list of persons to be employed for the Project.
      b. Present evidence that Workers have received proper training required by the regulations and the medical examinations required by OSHA 29 CFR 1926. 62.
      c. Submit documentation that Workers have been fit tested specifically for respirators used on the Project.

d. Submit copies of Proof of Lead Renovation Remolding certification for each person employed in the disturbance of lead.

7. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.
8. Material List: A complete materials list of all items proposed to be furnished and used under this Contract.
9. Subcontractor List: List of all subcontractors to be used on the Project (i.e. Waste Hauler).
10. Material Safety Data Sheets (MSDS): Copies of MSDS for each chemical or material used for the Project (paint stripper, surfactant, etc.)
11. Project Supervisor: Resume of the proposed Project Supervisor.
12. Rental Notifications: Notices sent to rental suppliers informing them of the nature of the Work that the Contractor intends to use the equipment for.
13. Worker's Acknowledgments: Statements signed by each employee that the employee has received training in the proper handling of lead containing paint; understands the health implications and risks involved; and understands the use and limitations of the respiratory equipment to be used.
14. Laboratory: Submit the documentation that the laboratory performing the OSHA personnel air samples is recognized as an Environmental Protection Agency National Lead Laboratory Accredited Program (NLLAP) accredited laboratory.
15. HUD Title X: "Guidelines for the Evaluation and Control of Lead Based Paint."

C. Project Close-out Submittals: 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 all EPA Certified Workers used in the performance of the Project, including name, social security number.
6. Required Employee Statements including Medical Examination Statement, Worker's Acknowledgment Statement, and Employee Training Statement.

1.04 PRE-CONSTRUCTION CONFERENCE

A. Prior to start of preparatory Work under this Contract, the Contractor shall attend a pre-construction conference attended by Owner, Facility Personnel, and Environmental Consultant.

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. Environmental Consultant'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 lead containing paint.
9. Waste disposal requirements and procedures.

C. In conjunction with the conference the Contractor shall accompany the Owner and Environmental Consultant 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.

1.05 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, Occupational Safety and Health Standards
2. 29 CFR 1926, Safety and Health Regulations for Construction
3. 40 CFR 148, Hazardous Waste Injection Restrictions
4. 40 CFR 260, Hazardous Waste Management System: General
5. 40 CFR 261, Identification and Listing of Hazardous Waste
6. 40 CFR 262, Standards Applicable to Generators of Hazardous Waste
7. 40 CFR 263, Standards Applicable to Transporters of Hazardous Waste
8. 40 CFR 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
9. 40 CFR 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
10. 40 CFR 268, Land Disposal Restrictions
11. 40 CFR 745, Lead; Identification of Dangerous Levels of Lead; Proposed Rule
12. 49 CFR 172, Hazardous Material Table, Special Provisions, Hazardous Material Communications, Emergency Response Information, and Training Requirements
13. 49 CFR 178, Specifications for Packaging
14. HUD 0005646, (1990; Rev May 1991) Lead-Based Paint: Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing

C. 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. UL 586, (1990) High-Efficiency, Particulate, Air Filter Units
4. NIOSH OSHA Booklet 3142, Lead in Construction
5. NFPA 701, (1989) Methods of Fire Test for Flame-Resistant Textiles and Films
6. EM 385-1-1, (1992) U.S. Army Corps of Engineers Safety and Health Requirements Manual

1.06 NOTICES

A. The Contractor shall post and/or provide notification to building occupants 10 days prior to beginning lead activities. The posting shall include the following information:
1. The locations of the lead Renovation Remolding Project.
2. The amounts and types of materials being removed and/or disturbed.
3. The commencement and completion dates of the Project.
4. The name, address, and certification of the Lead Contractor.
5. The name and address of the Environmental Consultant and laboratory.

1.07 PROJECT MONITORING AND WIPE SAMPLING

A. The Owner shall engage the services of an Environmental Consultant (the Consultant) who shall serve as the Owner's Representative in regard to the performance of the lead-based paint Project and provide direction as required throughout the entire lead period.

B. The Contractor is required to ensure cooperation of its personnel with the Consultant for the wipe sampling and project monitoring functions described below. The Contractor shall comply with all direction given by the Consultant during the course of the Project.

C. The Consultant 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 shall staff the Project with a trained person(s) to act on the Owner's behalf at the job site. At a minimum the trained person(s) shall be certified as a lead inspector or risk assessor. This individual shall be designated as the Lead Project Monitor (LPM).
   1. The LPM shall be on-site at all times the Contractor is on-site. The Contractor shall not be permitted to conduct any Work unless the LPM is on-site.
   2. The LPM shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The LPM shall have the authority to Stop Work when gross work practice deficiencies or unsafe practices are observed.
      a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
      b. Standby time required to resolve the situation shall be at the Contractor's expense.
   3. The LPM shall provide the following services:
      a. Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
      b. Verify daily that all Workers used in the performance of the Project are certified by the appropriate regulatory agency.
      c. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.
      d. Monitor, verify, and document all waste load-out operations.
      e. Verify that the Contractor is performing personal air monitoring daily, and that results are being returned and posted at the site as required.
   4. The following minimum inspections shall be conducted by the LPM. Additional inspections shall be conducted as required by Project conditions. Progression from one phase of work to the next by the Contractor is only permitted with the approval of the LPM.
      a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
      b. Pre-Commencement Inspection: The purpose of this inspection is to verify the integrity of each containment system prior to disturbance of any lead containing material. This inspection shall take place only after the Work Area is fully prepped for removal.
      c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the LPM during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.
      d. Visual Clearance Inspection: The purpose of this inspection is to verify the Contractor's certification that all materials have been removed from the Work Area and the absence of all visible accumulations of debris in the Work Area.
      e. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that work has been completed as contracted and the existing condition of the area prior to its release to the Owner.
   5. The LPM shall perform lead wipe (lead-dust clearance) sampling as follows:
      a. Wipe samples shall be collected from one sill surface and floor area surface where doors have been removed following the lead contractor's final cleaning of the work area. Lead wipe samples shall be analyzed by a NLLAP laboratory. Results shall be available within 24 hours of completing sampling.

6. The LPM shall perform a pilot air monitoring project as follows:
   a. Air samples shall be collected during the first phase of the lead project to determine if lead removal methods are generating airborne lead dust at concentrations exceeding regulatory guideline for locations exterior the Work Area. At least one air sample will be collected at the entrance to the Work Area and at critical barriers.
   b. Should it be established that airborne lead-dust concentrations, exterior to the work area, are within the applicable guidelines, no further air monitoring will be performed. Should airborne lead-dust concentrations, exterior the work area, be determined to exceed the applicable guideline concentration, additional engineering controls will be implemented and the pilot project repeated. Once affective engineering controls have been established and implemented, no further air monitoring will be performed.
   c. Lead air samples shall be analyzed by a NLLAP laboratory. Results shall be available within 24 hours of completing sampling.

1.08 CONTRACTOR AIR SAMPLING

A. In addition to the requirements of OSHA 1926.62, the Contractor shall be required to perform personal air monitoring to determine that appropriate respiratory protection is being utilized.

B. The Contractor's laboratory analysis of air samples shall be conducted by NLLAP approved laboratory, subject to approval of the Environmental Consultant.

C. Results of personnel air sample analyses shall be available, verbally, within twenty-four (24) hours of sampling and shall be posted upon receipt. Written laboratory reports shall be delivered and posted at the Work site within five (5) days.

1.09 PROJECT SUPERVISOR

A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
   1. The Project Supervisor shall hold Lead certification for the renovation & remolding of lead-based paint.
   2. The Project Supervisor 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. Prior to the commencement of Work, the Contractor shall submit the proposed Project Supervisor's resume to the Owner and Environmental Consultant for approval.

C. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without the written consent of the Owner and the Environmental Consultant.

D. The Project Supervisor shall maintain the Project Log Book required by section 2.03 of the specifications and a Waste Disposal Log.

E. 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 Lead Project Monitor.

1.10 MEDICAL REQUIREMENTS

A. Employers must make available medical examinations to all employees covered under the medical surveillance program. Medical exams must be performed:
   1. Medical Surveillance should have undergone an initial medical surveillance examination
   2. At least annually when tests within the preceding 12 months indicated a blood lead level at or above 40 µg/dl;
   3. Prior assignment for each employee for the first time to an area in which lead concentrations are above the action level;

4. As soon as possible when employee has developed signs or symptoms of lead exposure;
5. For employees medically removed from work area; and
6. For employees as final medical determination.

B. The medical exam consists of the following:
1. A detailed work and medical history with particular attention to past lead exposure (occupational and non-occupational), personal habits (smoking, hygiene), and past gastrointestinal, hematological, renal, cardiovascular, reproductive and neuralgic problems.
2. Through physical examination with particular attention to tooth, gums, hematological, gastrointestinal, renal cardiovascular, and neurological systems. Pulmonary status must be evaluated if respiratory protection will be used.
3. Blood sample and analysis which determines:
a. Blood lead level;
b. Hemoglobin and Hematocrit determinations, red cells indices and examination of peripheral smear Morphology;
c. Zinc protoporphyrin;
d. Blood Urea Nitrogen (BUN);
e. Respirator Health Check;
f. Pulmonary function testing;
g. Chest X-ray;
h. Electrocardiogram.

C. Employees may seek a secondary physician for a second opinion to review initial results, and conduct examination consultations and laboratory tests deemed necessary. If two physicians disagree and are unable to resolve differences a third physician may be contacted (see OSHA Lead Standard 29 CFR 1910.1025(j) for more details).

1.11 TRAINING

A. As required by applicable regulations, prior to assignment to lead Work instruct each employee with regard to the hazards of lead, safety and health precautions, and the use and requirements of protective clothing and equipment.

B. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134, and 29 CFR 1926.62. Provide respirator training and fit-testing.

1.12 RESPIRATORY PROTECTION

A. Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

B. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual. Fit-test records shall be maintained on site for each employee.

C. Respiratory protection will be based upon whether Class 1, 2, and 3 tasks are being performed, in accordance with 29 CFR 1926.62.

D. No respirators shall be issued to personnel without such personnel participating in a respiratory training program.

E. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134 and 29 CFR 1926.62.

F. A storage area for respirators shall be provided by the Contractor in the clean room side of the personnel decontamination enclosure where they will be kept in a clean environment.

G. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the Workday. Filters will be removed and

discarded during the decontamination process. Filters cannot be reused. Filters must be changed if breathing becomes difficult.

H. Filters used with negative pressure air purifying respirators shall not be used any longer than one eight (8) hour Workday.

I. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.

J. The Contractor shall have at least two (2) Powered Air Purifying Respirators stored on site designated for authorized visitors use. Appropriate respirator filters for authorized visitors shall be made available by the Contractor.

1.13 DELIVERY AND STORAGE

A. Deliver all 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.

C. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.

D. Protect materials from unintended contamination.

E. Remove damaged or deteriorated materials from the job site. Materials contaminated with lead shall be disposed of as lead debris as herein specified.

1.14 TEMPORARY UTILITIES

A. Shut down and lock out all electrical power to the lead Work Areas.

B. Provide temporary 120-280 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the lead Work Area.
   1. Where available, obtain from Owner's existing 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 wiring and receptacles as required by the Environmental Consultant 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.
   1. The entire Work Area shall be kept illuminated at all times.
   2. Provide lighting as required by the Environmental Consultant 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, headcoverings, 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 lead Work.

C. Eye protection and hard hats shall be provided and made available for all personnel entering any Work Area.

D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

2.02 SIGNS AND LABELS

A. Provide warning signs and barrier tapes at all approaches to lead Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.

1. Provide danger signs in vertical format conforming to 29 CFR 1926. Minimum 20” x 14” displaying the following legend.

DANGER
LEAD WORK AREA
POISON
NO SMOKING OR DRINKING
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE
CLOTHING ARE REQUIRED IN THIS AREA

2. Provide 3” wide yellow barrier tape printed with black lettered, “DANGER LEAD REMOVAL”. Locate barrier tape across all corridors, entrances and access routes to lead Work Area. Install tape 3’ to 4’ AFF.

B. Provide lead danger labels affixed to all lead materials, scrap, waste, debris and other products contaminated with lead.

1. Provide lead danger labels of sufficient size to be clearly legible, displaying the following legend, or equivalent:

DANGER
CONTAINS LEAD
AVOID CREATING DUST
POISON HAZARD

2. Provide the following lead labels, of sufficient size to be clearly legible, for display on waste containers (bags or drums) which will be used to transport lead contaminated material in accordance with United States Department of Transportation 49 CFR, Part 745.
3. Generator identification information shall be affixed to each waste container indicating the following printed in indelible ink:
   a. Generator Name:
   b. Facility Name:
   c. Facility Address:

2.03 PROJECT LOG BOOK

A. Provide a permanently bound Project log book of minimum 8-1/2” x 11” size. Log book shall contain on title page the Project name, name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Lead Contractor; emergency numbers including, but not limited to local Fire/Rescue department.

B. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.

C. All persons entering and exiting the Work Area shall sign the log and include name, social security number, and time.

D. The Project Supervisor shall document all Work performed daily and note all inspections.

2.04 SCAFFOLDING AND LADDERS

A. Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards.

B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.05 SURFACTANT (AMENDED WATER)

A. Wet all lead-containing materials prior to removal with surfactant mixed and applied in accordance with manufacturer's printed instructions.

2.06 ENCAPSULANT

A. Following lead scrapping, an encapsulant material shall be applied to the scrapped surfaces and remaining surfaces containing lead-based paint.

B. Approved Manufacturer:
   1. KapsulKote Inc.: KapsulKote II System – PrimerKote and FinishKote
   2. Premier Coatings, Inc.: Lead Block
   3. GLOBAL Encasement, Inc.: LeadLock GE-40
   4. Fiberlock Technologies, Inc.: L-B-C Lead Barrier Compound
   5. Fiberlock Technologies, Inc.: LeadMaster

2.07 DISPOSAL BAGS, DRUMS, AND CONTAINERS

A. Provide 6 mil polyethylene disposal bags. Bags shall also be imprinted with U.S. Department of Transportation required markings.

B. Provide 30 or 55 gallon capacity fiber or metal drums capable of being sealed air and water tight if lead waste has the potential to damage or puncture disposal bags. Affix lead 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.

D. Labeled lead waste containers or bags shall not be used for non-lead waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as lead waste.

2.08 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.

C. Approved Manufacturers:
   1. Hako Minuteman
   2. Micro-Trap Inc.
   3. Control Resource Systems, Inc.

2.09 POWER TOOLS

A. Any power tools used to drill, cut into, or otherwise disturb lead material shall be equipped with HEPA filtered local exhaust ventilation.

2.10 POLYETHYLENE SHEETING

A. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire-retardant sheeting.

B. Decontamination enclosure systems shall utilize at least 6 mil opaque fire-retardant plastic sheeting. At least 2 layers of 6 mil reinforced fire-retardant plastic sheeting shall be used for the flooring.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Should the area beyond the Work Area(s) become contaminated with lead containing materials, immediately stop Work and institute emergency procedures. Contaminated non-Work Areas shall be isolated and decontaminated in accordance with procedures established for lead 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. Medical approval, fit test reports, Worker Acknowledgments, and EPA certificates shall be on site prior to admittance of any Contractor's employees to the Work Area.

C. Perform all lead removal Work using wet removal procedures. Mix and apply surfactant in accordance with manufacturers written instructions. Dry removal procedures are not permitted.

D. The following documents shall be posted at the site at an approved location:
   1. Company license.
   2. Daily personal air monitoring results.
   3. Worker's EPA certificates (copies are acceptable provided Workers have original certificates in their possession).
   4. Medical records.
   5. Fit test reports.
   6. Project specifications.
   7. Project drawings.
   8. Notifications.
   9. Applicable regulations.
   10. Material Safety Data Sheets.
   11. Lead Work plan.
   12. List of emergency telephone numbers.
   13. 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. Provide a personnel decontamination enclosure contiguous to the Work Area, unless otherwise specified. The decontamination enclosure shall be attached to the Work Area and not located within it. If the decontamination chamber is accessible to the public it shall be fully framed and sheathed to prevent unauthorized entry. Alternately, a remote decontamination enclosure can be situated within 150 feet of the Work Area. Contamination enclosure requirements set forth in this part shall apply with the exception to Section 3.02.B. Access to the Work Area will not be directly through the decontamination enclosure.

B. Access to the Work Area will be from the clean room through an air-lock to the shower, through an air lock to the equipment room then into the Work Area. Each airlock shall be a minimum of three feet from door to door.

C. The decontamination enclosure ceiling and walls shall be covered with two layers of opaque 6 mil fire-retardant polyethylene sheeting. Two layers of 6 mil fire-retardant reinforced polyethylene sheeting shall be used to cover the floor.

D. Establish a triple layer of six mil fire-retardant polyethylene at the decontamination chamber doorways, weighted to insure a tight seal of the enclosure. Prior to establishing doorway seals move all required tools, scaffolding, and equipment into the Work Area.

E. The entrance to the clean room shall have a lockable door. Provide suitable lockers for storage of Worker's street clothes. Storage for respirators along with replacement filters and disposable towels shall also be provided.

F. Provide a temporary shower with individual hot and cold water supplies and faucets. Provide a sufficient supply of soap and shampoo. There shall be one shower for every six workers. The shower room shall be constructed in such a way so that travel through the shower chamber shall be through the shower. The shower shall not be able to be bypassed.

G. Shower water shall be drained, collected and filtered through a system with at least a 5.0 micron particle size collection capability containing a series of several filters with progressively smaller pore sizes to avoid rapid clogging of the system. The filtered waste water shall then be collected in a non-corrosive container and disposed of as lead waste according to all applicable laws.

H. The equipment room shall be used for the storage of tools and equipment. A labeled 6 mil plastic waste bag for collection of contaminated clothing shall be located in this room.

I. The personal decontamination enclosure shall be cleaned and disinfected minimally at the end of each Work shift and as otherwise directed by the Lead Project Monitor.

3.03 WORK AREA ENTRY AND EXIT PROCEDURES

A. Access to and from the Work Area is permitted only through the personnel decontamination enclosure.

B. Workers shall sign the entry/exit log upon every entry and exit.

C. The following procedures shall be followed when entering the Work Area:
   1. Before entering the Work Area, workers shall proceed to the clean room, remove all street clothes, and don protective clothing, equipment, and respirators. Two layer of protective clothing shall be required when a remote decontamination enclosure is being utilized.
   2. Workers shall proceed from the clean room through the shower room and the equipment room and into the Work Area.

D. The following procedures shall be followed when exiting the Work Area:
   1. Before leaving the Work Area, gross lead contamination will be removed by wet cleaning and HEPA vacuuming. At least two wet cleanings shall be performed with separate cleaning solutions and rinse waters.
   2. In the equipment room, workers shall remove disposable clothing, but not respirators, and shall place clothing in plastic disposal bags for disposal as contaminated debris prior to entering the shower room. For remote decontamination enclosures, one layer of protective clothing shall be removed prior to exiting the Work Are air lock.
   3. Workers shall shower thoroughly while wearing respirators, then wash respirator with soap and water prior to removal. Disposal towels shall be provided as well as a 6 mil plastic disposal bag for the collection of the contaminated towels.
   4. Upon exiting the shower, workers shall don new disposable clothing if work shift is to continue or street clothes to exit area. Under no circumstances shall workers enter public non-Work Areas in disposable protective clothing.

3.04 WORK AREA PREPARATION

A. Danger signs shall be posted at all approaches to the Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with caution signs on the non-Work Area side.

Provide all non-Work Area stairs and corridors accessible to the Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs. The Work Area shall be considered to include the entire room in which the window or door being addressed is located and any exterior locations constructed to enable the activities.

B. Shut down and lock out the building heating, ventilating, and air conditioning and electrical systems. Provide temporary electric power and lighting as specified herein.

C. All surfaces and objects within the Work Area shall be pre-cleaned using HEPA vacuuming and/or wet-wiping methods. Dry sweeping and any other methods that raise dust shall be prohibited.

D. Movable objects within the Work Area shall be HEPA vacuumed and/or wet-wiped and removed from the Work Area.

E. Should a construction barrier be constructed at the window or door opening being addressed, Paragraph 3.05.K will not be required.

F. All non-movable equipment in the Work Area shall be completely covered with 2 layers of fire-retardant polyethylene sheeting, at least 6 mil in thickness, and secured in place with duct tape and/or spray adhesive.

G. Provide enclosure of the Work Area necessary to isolate it from unsealed areas of the building in accordance with the approved Work plan and as specified herein.

H. Seal off all openings including but not limited to windows, diffusers, grills, electrical outlets and boxes, doors, floor drains, and any other penetrations of the Work Area enclosure, using 2 layers of at least 6 mil fire-retardant polyethylene sheeting to form a critical barrier.

I. Provide temporary framing and sheathing at openings larger than 32 square feet, which form the limits of the Work Area. Sheathing thickness must be a minimum of 3/8 inch and all sheathing shall be caulked and the Work Area side sealed with two layers of 6 mil fire-retardant polyethylene sheeting to form an isolation barrier.

J. Isolation barriers shall be installed at all elevator openings in the Work Area. Elevator controls shall be modified so that elevators bypass the Work Area.

K. Provide two layers of 6 mil fire-retardant polyethylene sheeting over all floor, wall, and ceiling surfaces. Isolation barriers shall also be covered with two layers (for a total of four layers). Sheeting shall be secured with spray adhesive and then sealed with duct tape. All joints in polyethylene sheeting shall overlap 12” minimum. Note that floor sheeting does not eliminate dust clearance sampling of the floor area below the sheeting and/or sampling of the sheeting floor area. Failure of either type of dust clearance sampling requires additional cleaning of the Work Area by the Contractor at no additional expense to the Owner.

L. Frame out emergency exits. Provide double layer 6 mil fire-retardant polyethylene sheeting and tape seal opening. Post as emergency exits only. Within the Work Area, mark the locations and directions of emergency exits throughout the Work Area using exit signs and/or duct tape.

3.05 RENOVATION AND REMOLDING OF LEAD-BASED PAINT

A. Renovation and Remolding shall be conducted in accordance with the Contract Documents and the approved Lead Work Plan.

B. If Lead-based Paint surfaces need to be addressed then it should be accomplished with a low pressure, airless fine spray of surfactant to ensure full penetration prior to material removal. Re-wet material if it does not display evidence of saturation.

C. One Worker shall continuously apply amended water while lead based paint is being removed.

D. Removal of lead-based paint shall be accomplished through manual scrapping.

E. Perform cutting, drilling, abrading, or any penetration or disturbance of lead containing material in a manner to minimize the dispersal of lead into the air. Use equipment and methods

specifically designed to limit generation of airborne particles. All power operated tools used shall be provided with HEPA equipped filtered local exhaust ventilation.

F. Upon removal of lead from the substrate, the newly exposed surfaces shall be HEPA vacuumed and/or wet cleaned. Surfaces must be thoroughly cleaned using necessary methods and any required solvents to completely remove any adhesive, mastic, etc. Wet and bag the debris as it is removed, using a 6 mil plastic disposable bag.

G. All removed material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate or whenever there is enough accumulation to fill a single bag or container. Maintain the surfaces of the Work Area free of accumulation of lead debris.

H. Dust-tight enclosed inclined chutes shall be used for materials dropped from distances greater than 10 ft.

I. Large components shall be wrapped in two layers of 6 mil polyethylene sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.

J. Power or pressure washers will not be allowed to be used for lead-based paint removal or clean-up procedures.

K. All construction and demolition debris determined by the Environmental Consultant to be contaminated with lead shall be handled and disposed of as lead waste.

3.06 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION AND REMOVAL PROCEDURES

A. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the Work Area before moving such items into the waste decontamination enclosure system airlock by persons assigned to this duty. The Work Area persons shall not enter the airlock. Large components may be moved directly to a waste container when a remote decontamination enclosure is being utilized. The component must be decontaminated within the work area and posse no health concerns when removed from the Work Area.

B. The cleaned containers of lead material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting, as the item's physical characteristics demand, and sealed airtight.

C. Containers and equipment shall be moved from the work area and into a holding area by persons dressed in clean personal protective equipment, who have entered from uncontaminated areas.

D. The cleaned containers of lead 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.

E. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.

F. 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.

3.07 WORK AREA DECONTAMINATION

A. Following completion of gross removal activities and after all accumulations of lead waste materials have been containerized, the following decontamination procedures shall be followed, unless otherwise specified.

B. Daily Cleaning:

1. According to the HUD Guidelines, “A thorough cleanup of the entire area under active abatement should occur daily during the entire abatement process. This daily cleanup should consist of the following:
   a. Large Debris:
      1) Large demolition-type debris (e.g., doors, windows, trim) should be wrapped in 6-mil plastic, sealed with tape, and moved to the area designated for trash storage on the property. Since lead-contaminated debris is a potentially hazardous waste, it should never be stored outside while awaiting removal/disposal. Consequently, an area inside the property must be designated as a temporary trash storage area, unless an approved container is to be located exterior to the building.
   b. Small Debris:
      1) Small debris should be collected by wet mopping or wet sweeping and disposed of properly. However, before any sweeping occurs, the affected surfaces should be sprayed with a fine mist of water, to keep surface dust from becoming airborne and potentially containing other areas of the property and lead workers. Dry sweeping is prohibited. The swept debris should be placed in double 4-mil or single 6-mil plastic bags, properly sealed, and moved to the designated trash storage area. Care should be taken not to overload trash bags, which otherwise may rupture or puncture during handling and transport.
   c. Exterior Cleanup:
      1) Using a containment system should protect unabated areas potentially affected by exterior lead activities. Because weather can adversely affect the exterior of the containment, the surface plastic of the containment system should be removed at the end of each workday. On a daily basis, as well as during final cleanup, the immediate area should be examined visually to ensure that no lead debris has escaped containment. Any such debris should be raked or wept swept and placed in single 6-mil or double 4-mil plastic bags, which should then be sealed and stored along with other contaminated debris.
      2) At the conclusion of the lead activities, a final cleanup must occur. This is a much more thorough process than the daily cleanup. Failure to perform an adequate final cleanup will result in failure to pass post-lead-dust clearance.

C. Preliminary Final Cleanup:
   1. Before final cleanup can begin and before abated surfaces can be painted or sealed, the plastic sheeting used for containment must be removed. This contaminated plastic sheeting must be removed and disposed of very carefully. Removal should start with upper-level plastic, as applicable. The plastic should be sprayed or misted with water to hold down dust, and then folded in upon itself to trap any dust residues inside. Before removal of floor plastic, it should be sprayed and swept as detailed earlier in this chapter. It should be folded carefully from the corners/ends to the middle to trap any remaining lead dust and placed into double 4-mil or single 6-mil plastic bags that are then sealed and removed from the premises. As with daily cleanups, this plastic removal process requires the use of protective equipment, especially appropriate respirators. Plastic sheets used to isolate contaminated rooms from non-contaminated rooms should not be removed at this time. These sheets should remain until after the preliminary final cleanup/final cleanup is complete and satisfactory lead dust clearance results are obtained. Then the plastic sheets used to isolate contaminated rooms from non-contaminated rooms should be carefully removed as described above.
   2. After the plastic has been removed from the contaminated area, the entire area should be HEPA-vacuumed as detailed in HUD Guidelines, Section 10.2.1, starting with the rooms farthest from the entrance to avoid retracking dust through the already-cleaned area. In each room, vacuuming should begin with the ceilings and proceed down the walls, making

sure every surface is treated, including doors and door trim, windows, window sills, wells, and trim, baseboards, etc

3. The entire affected area should next be washed down with a TSP solution as detailed above and then it should be HEPA-vacuumed again using the steps already outlined. The contractor must not deviate from or skip any step. To do so could mean that hazardous levels of lead dust and residue could be embedded in the new paint and mobilized later when that paint deteriorates or is abraded.
4. Prior to and after isolation and critical barriers are removed, the Lead Project Monitor shall inspect the Work Area for cleanliness. If necessary, additional cleaning shall be performed by the Contractor as directed by the Lead Project Monitor.
5. As a result of any visual inspection by the Lead Project Monitor, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.

D. Final Cleanup Procedures
   1. The final clean-up procedures is as follows:
      a. Remove the top layer of 6-mil poly and seal in bags or clean 6-mil poly.
      b. Remove bags of poly and store in a secure area.
      c. Vacuum all surfaces with a HEPA-equipped vacuum beginning with the ceiling and working down.
      d. Wash all surfaces with TSP (trisodium phosphate) detergent.
      e. Vacuum all surfaces a second time.
      f. Wash all surfaces a second time.
      g. Remove all contaminated equipment and material to secure storage area.
      h. Removal final layer of poly, except isolation and critical barriers are to remain. Isolation and critical barriers are to be removed following satisfactory lead wipe clearance results.
      i. Vacuum floors with HEPA-equipped vacuums.
      j. Wash surfaces again with TSP.
      k. Vacuum again.
      l. Seal surfaces with paint, polyurethane, or wax.

E. Cleanup Confirmation (Lead Dust Clearance)
   1. The LPM will be collection lead wipe samples to confirm the effectiveness of the cleanup activities. Lead-dust results shall be available within 24 hours of completing sampling. Following satisfactory reporting of the results, all isolation and critical barriers shall be removed. Should results indicate lead-dust present at concentrations exceeding the acceptable guideline level, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.
   2. The established clearance level for dust-lead for floors is 10 micrograms per square foot (ug/ft2) and for window sills the clearance level is 100 micrograms per square foot (ug/ft2). This level has been established as part of Title 40 of the Code of Federal Regulations Part 745 (40 CFR Part 745). If the contractor should fail the wipe tests for lead dust clearance, the contractor shall pay for additional testing until clearance is obtained

3.08 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 lead 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 lead activities.

PART 4 - DISPOSAL OF LEAD WASTE

4.01 APPLICABLE REGULATIONS

A. All lead waste shall be stored, transported and disposed of in accordance with the following regulation(s) as a minimum:
   1. NYS DEC 6 NYCRR.

4.02 TRANSPORTATION AND DISPOSAL SITE

A. The Contractor's Hauler and Disposal Site shall be approved by the Owner.

B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal Working hours unless otherwise specified. No waste may be taken from the site unless the Environmental Consultant is present and authorizes the release of the waste as described herein.

C. The Contractor shall have the Hauler provide the estimated date and time of arrival at the Disposal Site.

D. Upon arrival at the Project Site, the Hauler must possess and present to the Environmental Consultant a valid New York State Department of Environmental Conservation Hauler's Permit. The Environmental Consultant may verify the authenticity of the hauler's permit with the proper authority.

E. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Waste Manifests.

F. 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 lead material. The Hauler must travel directly to the disposal site without unauthorized stops.

4.03 WASTE STORAGE CONTAINERS

A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.), open containers will not be permitted on-site (i.e. open dumpster with canvas cover, etc.).

B. The Environmental Consultant shall verify that the waste storage container tags (license plates) match that listed on the New York State Department of Environmental Conservation permit. Any container not listed on the permit shall be removed from the site immediately.

C. The container shall be plasticized and sealed with a minimum of one (1) layer of 6 mil polyethylene on the sides and two (2) layers of 6 mil polyethylene on the floor.

D. While on-site, the container shall be labeled with EPA Danger signage:

DANGER
CONTAINS LED
AVOID CREATING DUST
POISON HAZARD

E. The New York State Department of Environmental Conservation Hauler's Permit number shall be stenciled on both sides and back of the container.

F. Once the container is loaded at the site, the door(s) will be locked at all times.

G. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.

H. Before the container is removed from the Project Site for transportation to the Disposal Site the locks shall be removed at the Disposal Site by the operator of the Disposal Facility and returned by the Disposal Facility to the Contractor.

1. The Owner may initiate random checks at the Disposal Site to insure that the procedures outlined herein are complied with.

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 maintenance of existing unit masonry on all exterior elevations of school buildings, consisting of brick, cast stone, and other masonry surfaces, and cleaning as follows:
   1. Preliminary cleaning, including removing plant growth, dirt, debris, stains, moss, and efforescence.
   2. Cleaning exposed unit masonry surfaces.
   3. Protection of adjoining and nearby non-masonry items.

1.03 DEFINITIONS

A. Very Low-Pressure Spray: Under 100 psi (690 kPa).

B. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

C. Medium-Pressure Spray: 400 to 800 psi (2750 to 5510 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

D. High-Pressure Spray: 800 to 1200 psi (5510 to 8250 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

E. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

1.05 INFORMATIONAL SUBMITTALS

A. Cleaning Program.

1.06 QUALITY ASSURANCE

A. Cleaning Specialist Qualifications: Engage an experienced, masonry cleaning firm to perform work of this Section. Firm shall have completed work similar in extent to that indicated for this Project with a record of successful in-service performance.
   1. Field Supervision: Cleaning specialist firms shall maintain experienced full-time supervisors on Project site during times that cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond the control of cleaning specialist firm.
   2. Cleaning Worker Qualifications: Persons who are experienced and specialize in cleaning work of types they will be performing.
   3. Masonry cleaning work shall conform to National Park Service Preservation Briefs #1 and #2.

B. Chemical-Cleaner Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.

C. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

D. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials

and tools without damaging masonry. Include provisions for supervising performance and preventing damage due to worker fatigue.

E. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used, protection of surrounding materials, and control of runoff during operations.
   1. If materials and methods other than those indicated are proposed for any phase of restoration work, add to the Quality-Control Program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and worker's ability to use such materials and methods properly.

F. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 20 feet (6 m) away by Architect. Perform additional paint and stain removal, general cleaning, and spot cleaning of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.

G. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to masonry cleaning including, but not limited to, the following:
      a. Construction schedule. Verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays. Coordinate work areas with school schedule and activities.
      b. Materials, material application, sequencing, tolerances, and required clearances.
      c. Protection of adjacent non-masonry items.
      d. Coordination with masonry replacement control joint installations, repointing and other masonry work in defined areas.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver cleaning materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

1.08 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit cleaning work to be performed according to manufacturers' written instructions and specified requirements.

B. Clean masonry surfaces only when air temperature is 40 deg F (4 deg C) and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.09 COORDINATION

A. Coordinate masonry cleaning with public circulation patterns at Project site. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.10 SEQUENCING AND SCHEDULING

A. Order cleaning materials at earliest possible date to avoid delaying completion of the Work.

B. Perform masonry cleaning work in the following sequence:
   1. Remove plant growth.
   2. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
   3. Remove paint.
   4. Clean masonry surfaces.
   5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
   6. Repair masonry, including replacing existing masonry with new masonry materials.

7. Rake out mortar from joints to be repointed.
8. Point mortar and sealant joints.
9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
10. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units.

PART 2 - PRODUCTS

2.01 PAINT REMOVERS (IF REQUIRED)

A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste formulation for removing paint coatings from masonry.
   1. Products: Subject to compliance with requirements, provide the following:
      a. PROSOCO; Enviro Klean Safety Peel 2.
      b. Architect approved equivalent.

2.02 CLEANING MATERIALS

A. Water: Potable.

B. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium polyphosphate, 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every 5 gal. (20 L) of solution required.

C. Job-Mixed Mold, Mildew, and Algae Remover: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium polyphosphate, 5 quarts (5 L) of 5 percent sodium hypochlorite (bleach), and 15 quarts (15 L) of hot water for every 5 gal. (20 L) of solution required.

D. Non-acidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9 that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces.

E. Non-acidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
   1. Products: Subject to compliance with requirements, provide the following:
      a. PROSOCO; Enviro Klean 2010 All Surface Cleaner.
      b. Architect approved equivalent.

F. Masonry Prewash: Alkaline-based cleaning compound formulated to dissolve and assist in removal of heavy carbon encrustations from calcareous masonry such as Limestone and Sandstone. Use in conjunction with a Limestone Restorer to neutralize surfaces treated with Masonry Prewash.
   1. Prewash Product:
      a. PROSOCO 766 Limestone and Masonry Prewash.
      b. Architect approved equivalent.
   2. Neutralizer Product:
      a. PROSOCO Sure KLean Restoration Cleaner, Limestone & Masonry Afterwash.
      b. PROSOCO Limestone Restorer.
      c. Architect approved equivalent.

2.03 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.

1. Products: Subject to compliance with requirements, provide the following:
   a. PROSOCO; Sure Klean Strippable Masking.
   b. Architect approved equivalent.

B. Sealant Materials:
1. Provide manufacturer's standard chemically curing, elastomeric sealant(s) of base polymer and characteristics indicated below that comply with applicable requirements in Section 079200 - JOINT SEALANTS.
   a. Single-component, non-sag urethane sealant.
2. Colors: Provide colors of exposed sealants to match colors of masonry adjoining installed sealant unless otherwise indicated.

C. Joint-Sealant Backing:
1. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where acceptable.

2.04 CHEMICAL CLEANING SOLUTIONS

A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

B. Acidic Cleaner Solution for Brick: Dilute with water to produce hydrofluoric acid content of 3 percent or less, but not greater than that recommended by chemical-cleaner manufacturer.

PART 3 - EXECUTION

3.01 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being cleaned, building site, plants, and surrounding buildings from harm resulting from masonry cleaning work.
1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of cleaning work.

B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Keep wall wet below area being cleaned to prevent streaking from runoff.
3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property at an approved NYSDEC facility.
5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.02 CLEANING MASONRY, GENERAL

A. Proceed with cleaning in an orderly manner; work from bottom to top of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.

B. Use only those cleaning methods indicated for each masonry material and location.
   1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being utilized. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
   2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
      a. Equip units with pressure gauges.
   3. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
   4. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
   5. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F (60 and 71 deg C) at flow rates indicated.

C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

D. Water Application Methods:
   1. Water-Soak Application: Soak masonry surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
   2. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches (152.4 mm) from surface of masonry and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

E. Chemical-Cleaner Application Methods: Perform a test panel (4 foot high by 4 foot long) to ensure surfaces will not be harmed or stained by application of undiluted material. Apply chemical cleaners to masonry surfaces to comply with chemical-cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi (345 kPa). Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.

F. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
   1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

G. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.03 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.

B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, caulking, asphalt, and tar.
   1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
   2. Remove paint and calking with alkaline paint remover.
      a. Comply with requirements in "Paint Removal" Article.
      b. Repeat application up to two times if needed.

3.04 PAINT REMOVAL

A. Paint Removal with Alkaline Paste Paint Remover:
   1. Remove loose and peeling paint using low -pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
   2. Allow paint remover to remain on surface for period recommended by manufacturer.
   3. Rinse with hot water applied by low -pressure spray to remove chemicals and paint residue.
   4. Repeat process if necessary to remove all paint.
   5. Apply acidic cleaner or manufacturer's recommended afterwash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical cleaner or afterwash manufacturer.

3.05 CLEANING BRICKWORK

A. Cold-Water Soak:
   1. Apply cold water by intermittent spraying to keep surface moist.
   2. Use perforated hoses or other means that will apply a fine water mist to entire surface being cleaned.
   3. Apply water in cycles with at least 30 minutes between cycles.
   4. Continue spraying until surface encrustation has softened sufficiently to permit its removal by water wash, as indicated by cleaning tests.
   5. Continue spraying for 72 hours.
   6. Remove soil and softened surface encrustation from masonry with cold water applied by low-pressure spray.

B. Cold-Water Wash: Use cold water applied by low-pressure spray.

C. Detergent Cleaning:
   1. Wet masonry with cold water applied by low-pressure spray.
   2. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.
   3. Rinse with cold water applied by low -pressure spray to remove detergent solution and soil.
   4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

D. Mold, Mildew, and Algae Removal:
   1. Wet masonry with hot water applied by low-pressure spray.
   2. Apply mold, mildew, and algae remover by brush or low-pressure spray.
   3. Scrub masonry with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that masonry surface remains wet.
   4. Rinse with cold water applied by medium -pressure spray to remove mold, mildew, and algae remover and soil.

5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

E. Nonacidic Gel Chemical Cleaning:
   1. Apply non-acidic gel cleaner in 1/8-inch (3-mm) thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout area being cleaned.

3.06 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
   1. Do not use metal scrapers or brushes.
   2. Do not use acidic or alkaline cleaners.

B. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

C. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

D. Restoration cleaning:
   1. All protective strippable masking, polyethylene sheeting and tape shall be removed.
   2. Window glass or painted or unpainted metal that shows evidence of contamination from chemicals shall be thoroughly washed with clear water.
   3. All debris from this operation shall be removed from the job site, upon completion.

END OF SECTION

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PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes maintenance, restoration and cleaning of masonry as follows:
   1. The removal of select areas, sections, individual brick that are damaged, stained or otherwise unacceptable in appearance and replacement with salvaged brick to match adjacent brick.

B. RELATED SECTIONS: the following sections contain requirements that relate to the Section.
   1. Section 040120 - Maintenance of Unit Masonry
   2. Section 040343 - Masonry Repointing
   3. Section 040513 - Mortar
   4. Section 040523 - Masonry Accessories
   5. Section 042113 - Brick Masonry
   6. Section 079200 - Sealants

1.03 SUBMITTALS

A. Product Data:
   1. Portland Cement: Brand and Manufacturer's name.
   2. Lime: Brand and Manufacturer's name.
   3. Mortar Pigments: Brand and Manufacturer's name.
   4. Packaged Products: Manufacturer's specifications and application instructions for products specified.
   5. Sand: Location of pit, name of Owner, and previous test data.

B. Samples: Deliver to the Site for comparison with existing masonry.
   1. Mortar for exposed joints and cracks: Each required type, minimum 12 inches long by full thickness, showing finish and color.
   2. Masonry Units: Each required type, full size, showing finish and full color range.

1.04 QUALITY ASSURANCE

A. Material Container Labels: Material containers shall bear the manufacturer's label indicating manufacturer's name, trade name of product, lot number shelf life of product, and mix ratio (if applicable).

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packaged Products:
   1. Deliver materials to the site in manufacturer's original, sealed container. Do not deliver materials which have exceeded shelf life limitation set forth by manufacturer.
   2. Comply with manufacturer's printed instructions for storing and protecting materials.

B. Bulk Aggregate: Store in a manner which will keep aggregate clean and protected from the weather elements.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:
   1. For factory packaged products, comply with the manufacturer's printed limitations and instructions.
   2. At temperatures below 40° F, maintain mortar temperature between 40° F and 120° F unless otherwise recommended by the material manufacturer. If necessary, heat mixing water and sand to produce the required results.

3. At temperatures between 32° Fand 20° F, provide wind breaks and cover the restored masonry to prevent wetting and freezing. Maintain restored masonry above freezing for not less than 16 hours using auxiliary heat or insulating blankets.
4. At temperatures below 20° F, provide heated enclosures for performing the Work. At the end of the workday, maintain the enclosures and keep the Work from freezing for not less than 24 hours.
5. Do not lower freezing point of mortar by use of antifreeze, calcium chloride, or other additives.
6. Do not use frozen materials or materials coated with ice or frost.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mortar:
   1. Use mortar approved in Section 040513 - Masonry Repointing and 040513 - Mortar.

B. Mortar Color: Match existing adjacent mortar color. Note: Multiple colors or shades of colors may be required.

C. Brick: Use salvaged and/or new brick that closely match adjacent brick around the restoration area, for brick exposed to view.

PART 3 EXECUTION

3.01 PREPARATION

A. Protection: Protect adjacent surfaces not being restored. Protect sills, ledges, and projections from material droppings.

B. Surface Preparation:
   1. Prepare surfaces to be restored in compliance with product manufacturer's printed instructions and as specified.
   2. Remove dirt, dust, and foreign material from surfaces to be restored.
   3. Clean areas to be restored with compressed air or water flushing, except as otherwise recommended by the mortar manufacturer.

C. Materials Preparation:
   1. Dry concrete masonry units and stone that have become wet. Do not wet these masonry units.
   2. Prepare exposed Type N mortar and Modified Type N pointing mortar to match the color and appearance of existing adjoining mortar.

3.02 REPLACING MASONRY UNITS

A. Provide temporary shoring other supports as required to prevent displacement of existing masonry which is to remain. Perform the removal Work with such care as may be required to prevent damage to adjoining masonry which is to remain.

B. Remove the deteriorated and damaged masonry units to their full depth, including the surrounding joint mortar. Wherever possible without damaging masonry, use a rotary power masonry saw for cutting Work. Leave square corners and adjoining masonry which is to remain. Clean joints and cavities by flushing with water or compressed air.

C. Dampen contact surfaces slightly before application of mortar, making sure there is no free water. Install matching masonry units with Type N mortar. Install units to match and align with existing masonry. Maintain bonding and coursing pattern of existing masonry. Use presoaked wood wedges where necessary to properly set the units and maintain uniform matching joints. Backpack and fill joints full of mortar. Finish joints to match existing adjoining joints.

3.03 CLEANING

A. As the Work proceeds and after completion of Work, remove excess mortar, droppings, smears, stains, and other soiling substances resulting from the Work of this Section. Remove misplaced materials from surfaces immediately.

END OF SECTION

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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 historic masonry repointing work as follows:
   1. Removing cracked, broken, stained, and/or loose mortar in exterior brick joints.
   2. Raking and cleaning mortar joints.
   3. Installing new mortar to match existing mortar.
   4. Installing joint sealant and backer rod.

1.03 RELATED REQUIREMENTS

A. Section 040120 - Maintenance of Unit Masonry.

B. Section 040121 - Masonry Restoration.

C. Section 040513 - Mortar.

D. Section 042113 - Brick Masonry.

E. Section 079200 - Sealants.

1.04 REFERENCE STANDARDS

A. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2026.

B. ASTM C150/C150M - Standard Specification for Portland Cement; 2024.

C. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

D. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

E. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

G. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.05 DEFINITIONS

A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

B. Pointing Mortar: Mortar used to seal joints at the exposed faces of masonry units; may include decorative aggregate or pigments for color and may be tooled in a decorative manner.

C. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.

D. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference on masonry repointing at Project Site. Coordinate with all other masonry related pre-installation conferences into one.
   1. Review methods and procedures related to repointing masonry, including, but not limited to, the following:
      a. Masonry repointing specialist’s personnel, equipment, and facilities needed to make progress and avoid delays.
      b. Materials, material application, and sequencing.
      c. Quality-control program.

d. Fire-protection plan.
e. Repointing program.
f. Coordination with building occupants.

B. Sequence and Scheduling:
1. Order pre-mixed mortar for repointing mortar immediately after approval of Samples based on preconstruction results. Take delivery of and store at Project site a sufficient quantity of pre-mixed mortar to complete Project.
2. Perform masonry repointing work in the following sequence:
a. Remove broken, cracked, stained and/or loose mortar.
b. Rake out joints.
c. Clean mortar joints.
d. Point mortar joints.
e. After repointing has been completed and cured, perform a final cleaning to remove residues from this work.
3. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in mortar joints according to this Section.

1.07 SUBMITTALS

A. Product Data: For each type of product indicated.
1. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

B. Shop Drawings:
1. Include plans, elevations, sections, and locations of masonry repointing on the structure.
2. Show joint details for each type of joint required, including joint width, raking depth, and tooled joint profile.
3. Show provisions for expansion joints or other sealant joints.
4. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.

C. Samples: Before erecting mock-up, submit samples of the following:
1. Each type of pointing mortar in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.
a. Include with each sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.
2. Sealant materials. Provide manufacturer’s printed brochure showing full color range for initial selection. Provide cured physical sealant samples for verification. Provide cured sample with sanded finish if required.
3. Include similar Samples of accessories involving color selection.

D. Qualification Data: For restoration specialists including restoration firm, field supervisors, architectural conservator, and mortar manufacturer.

E. Quality-control Program.

F. Repointing Program.

1.08 QUALITY ASSURANCE

A. Masonry Repointing Specialist Qualifications: The Contractor performing the work of this Section shall be regularly engaged in repointing historic masonry and shall demonstrate to the satisfaction of Owner/Architect that, within the previous 5 years, they have successfully performed and completed in a timely manner, at least 3 projects similar in scope and type to the required work.
1. Foreman: Work of masonry repointing shall be directly supervised by a full-time foreman who has experience equal to or greater than that required of the Masonry Repointing

Specialist. The foreman shall read and speak English fluently. The foreman shall be on the site daily for the duration of the work and shall remain on the job throughout the work unless his performance is deemed unacceptable. The foreman shall hold valid installer certification from each product used where offered or required by the manufacturer.

2. Mechanics: Masonry repointing shall be carried out by a steady crew of skilled mechanics who are thoroughly experienced with the materials and methods specified, have a minimum of 3 years' experience with work on buildings similar to that required by this Section, and are familiar with the design requirements. Contractor shall certify that all mechanics employed for masonry repointing work fully understand the requirements of the Project. Each mechanic shall hold valid installer certification from each product used where offered or required by the manufacturer.
    a. Provide one crew of mechanics for the duration of the project. Substitutions and additions of work force shall be permitted with the Architect's consent, so long as there is no adverse effect on quality or performance of work.

B. Mortar Manufacturer Qualifications: A firm regularly engaged in producing masonry mortar for preservation work that has been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no extra cost to Owner.
    1. Acceptable manufacturers include:
        a. Cathedral Stone Products, 7266 Park Circle Drive, Hanover, MD 21076, (800) 684-0901, www.cathedralstone.com
        b. Conproco Corporation, 17 Production Dr., Dover, NH 03820, (800) 258-3500, www.conproco.com
        c. Edison Coatings, 3 Northwest Drive, Plainville, CT 06062, (800) 341-6621, www.edisoncoatings.com
        d. Freedom Cement, 70 East Brookfield Road North Brookfield, MA 01535, (866)254-7277, www.freedomcement.com
        e. Glen-Gery Corporation, 1166 Spring Street, PO Box 7001 Wyomissing, PA 19610, (610) 374-4011, www.glengery.com
        f. Spec Mix, 1230 Eagan Industrial Rd., Suite 160, Eagan, MN 55121, (888) 773-2649, www.specmix.com
        g. U.S. Heritage Group; Heritage Restoration Mortars; 0352 Franklin Ave, Franklin Park, IL 60131, (773)286-2100, www.usheritage.com
        h. WorkRite Cements, 5952 Lincoln Highway West, Thomasville, PA 17364, (717) 792-4700, .workrite-cements.com
        i. Architect approved equivalent

C. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising worker performance and preventing damage.
    1. If mechanical grinders are used to cut joints, include provisions for supervising performance and preventing damage due to worker fatigue.
    2. Include methods for containment of and protection of workers from silica containing dust in compliance with applicable Local, State, and Federal regulations.

D. Repointing Program: For each phase of restoration process, provide detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials on building and Project site.
    1. Include methods for keeping pointing mortar damp during curing period.
    2. If materials and methods other than those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.

E. All work shall conform to the requirements of the Secretary of the Interior's Standards for Rehabilitation 36 CFR 67.

1.09 MOCK-UPS

A. General: Before beginning brick masonry restoration, prepare mock-ups to demonstrate aesthetic effects and qualities of materials and execution and to provide standards for work of this Section. Do not proceed with brick restoration until Architect has approved relevant mock-ups.
   1. Locate mock-ups on existing walls that are representative of the range of as-built conditions to be encountered in the remainder of work in locations as directed by or acceptable to Architect and accessible for review by Owner and Architect.
   2. Provide a minimum of 48 hours' notice to Architect prior to start of each mock-up.
   3. Architect will monitor mock-ups. Mock-ups performed in the absence of Architect will not be accepted.
   4. Mock-ups shall be performed by the same crew who will be executing the work and following requirements of this Section.
   5. Repeat mock-ups as necessary to obtain approval by Architect.
   6. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration until time of Substantial Completion.
   7. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the work.
   8. Approved mock-ups will represent the minimum acceptable standard for brick masonry restoration work. Subsequent work that does not meet the standard of approved mock-up will be rejected.

B. Prepare the following mock-ups:
   1. Mortar Removal: In an inconspicuous location, each mechanic scheduled to mechanically cut the joints shall perform a mock-up in the presence of the Architect to demonstrate the ability of the operator to use tools without damaging the masonry. Cut joints and prepare for pointing as specified below. Each mock-up area shall measure approximately 16 square feet (4 by 4 feet) and include both horizontal and vertical joints. Any worker that damages the masonry will not be permitted to cut joints. Only those workers approved by the Architect may use hand-held grinders or other power tools to cut joints.
   2. Repointing: For each type of masonry and joint required, provide a pointing mock-up measuring approximately 16 square feet (4 by 4 feet).

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

B. Store mortar mix and other cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

1.11 FIELD CONDITIONS

A. Materials shall be used only at the manufacturer's recommended temperature tolerances or as indicated below, whichever is more conservative.

B. Cold Weather Requirements: Pointing work may only be performed when temperatures remain above 40 degrees F and are predicted to remain so for at least seven days after completion of work. If in any given 24-hour period the temperature drops or is expected to drop below 40 degrees F at any time, work will not recommence until a constant temperature of 40 degrees F or higher is projected for a minimum of 72 hours. Once stopped for reason of temperature, work will recommence only upon approval of the Architect.
   1. Do not leave joints raked and open when temperatures fall below 40 degrees F. Provide temporary protection of raked joints, such as cylindrical sealant backings (closed-cell foam backer rod), when temperatures fall below 40 degrees F.

C. Hot Weather Requirements: Do not apply mortar to substrates with temperatures of 90 degrees F and above unless otherwise indicated. Protect freshly installed mortar when temperature and humidity conditions produce excessive evaporation of water from mortar. Provide artificial shade and wind breaks and use cooled materials to minimize evaporation during mortar placement. Protect freshly installed mortar from premature drying or rapid curing by using dampened burlap, plastic sheeting, or periodically misting with water to keep mortar moist for 72 hours following final tooling.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Source Limitations: Obtain each type of material for masonry repointing work from one source with resources to provide materials of consistent quality in appearance and physical properties.

2.02 MORTAR MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I; white or gray, or both where required for color matching of mortar.
   1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Masonry Cement: Not permitted.

D. Mortar Cement: Not permitted.

E. Mortar Sand: ASTM C144 natural sand blend, rounded to sub-angular in shape, washed, screened, and dried.
   1. Match size, texture, and gradation of existing mortar sand as closely as possible while remaining in compliance with ASTM C144 grading and soundness requirements. Blend several sands if necessary to achieve suitable match.
   2. Color: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.

F. Mortar Pigments: Pigments, if required to match original mortar color, shall be non-fading, UV-stable pigments meeting the requirements of ASTM C979/C979M. When blended with other dry components, the pigment proportion shall not to exceed 10 percent by weight of the cementitious or binder materials, except for carbon black, which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

G. Admixtures: Admixtures, including air-entraining agents, anti-freeze additives, latex modifiers, calcium chloride, or otherwise, shall not be used without the express written consent of the Architect and the mortar manufacturer. Calcium chloride is not permitted in any mortar.

H. Water: Potable.

2.03 MORTAR MIXES

A. Match existing mortar mix: For each variation in mortar type or color required, match existing mortar color, texture, materials and mix proportions while complying with the material requirements of this Section and the mix proportion requirements of ASTM C270.

B. Only pre-proportioned, dry-blended mixes packaged under factory-controlled conditions shall be permitted.

2.04 ACCESSORY MATERIALS

A. Masking Tape: Non-staining, non-absorbent material, compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

B. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below and according to applicable requirements in Section 079200 - Joint Sealants.
    a. Type: Single-component, nonsag urethane sealant.
    b. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.
    c. Sanded Joints: Provide mortar sand or ground mortar consisting of existing mortar retrieved from joints ground to a particle size that matches the adjacent mortar aggregate and color. Remove all fines passing the #100 sieve.
    d. Sealant Primer: Use type recommended by sealant manufacturer.

C. Joint-Sealant Backing:
1. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended in writing by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

D. Other Products: Select materials and methods of use based on the following, subject to approval of a mock-up:
1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could do the following:
    a. Remove, alter, or harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in Contract.
    b. Leave residue on surfaces.

2.05 EQUIPMENT

A. Use of rotary grinders, power chisels, or any other power tools for cutting and raking joints will be permitted only with prior written approval of tool types, locations, and mechanics by the Architect. If mechanical grinders are approved by the Architect for cutting the horizontal joints, the blade must be diamond-impregnated metal measuring no larger than 4-1/2 inches in diameter, 1/16 inches in thickness.

B. Pneumatic Chisels: Barre Type B, short stroke, such as that manufactured by Trow and Holden (45 South Main St., Barre, VT 05641, Phone: 800-451-4349, Website: www.trowandholden.com) or similar, may be used with the approval of the Architect.

C. Chisels shall be narrower than the joints in which they are used.

D. Special Tools: Provide special knives or special thin cutter blades for use in joints less than 1/8 inch in width.

E. Brushes for cleaning joints shall be stiff, plastic or natural bristle brushes. Wire brushes shall not be used.

F. Trowels for Pointing: Long, thin pointing trowels that are narrower than joints being pointed.
1. Fabricate special trowels for pointing if necessary to provide for proper insertion and compaction of mortar or where required to achieve the desired tooled profile.

G. Pressure Washer: Pressure washers shall be fitted with a 40 degree fan-shaped nozzle, in-line pressure gauge, and pressure regulator. Operating pressure shall not exceed those specified, as measured in-line, and equipment shall be capable of providing the specified flow rate.

1. Spray nozzle shall be kept at minimum 1 foot away from the masonry surface. A dowel may be taped to the wand that projects 1 foot beyond the nozzle to ensure that the nozzle remains at minimum 1 foot way from the surface.

PART 3 EXECUTION

3.01 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work, including removals and new infill work.
   1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.

B. Prevent mortar from staining face of surrounding masonry and other surfaces.
   1. Cover sills, ledges, and projections to protect from mortar droppings.
   2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
   3. Immediately remove mortar in contact with exposed masonry and other surfaces.
   4. Clean mortar splatters from scaffolding at end of each day.

3.02 GENERAL

A. Repointing Appearance Standard: Repointed joints are to have a uniform appearance as viewed from ten (10) feet away by the Architect.

3.03 MORTAR REMOVAL

A. Carefully document existing joint profile and width prior to mortar removal.

B. Rake out and repoint joints to the following extent:
   1. All joints in areas indicated in the Contract Drawings.
   2. Joints at locations of the following defects:
      a. Holes and missing mortar.
      b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
      c. Cracks 1/8 inch or more in width and of any depth.
      d. Hollow-sounding joints when tapped by metal object.
      e. Eroded surfaces 1/4 inch or more deep.
      f. Deterioration to point that mortar can be easily removed by hand without tools.
      g. Joints filled with substances other than mortar.

C. Do not damage the edges of masonry units or widen joints. Any masonry unit damaged by mortar removal shall be removed and replaced in kind at the Contractor’s expense at the direction of the Architect.

D. Remove mortar to provide joints with square backs and to expose masonry for contact with pointing mortars or sealant. Brush, vacuum, or flush joints with water to remove all dirt and loose debris.

E. Removal Depth:
   1. Pointed Joints: Cut joints and rake clean to a depth equal to two and one-half times the joint width (Example: Rake 1/2-inch-wide joints to a depth of 1-1/4 inches), or to sound mortar, whichever is deeper.
      a. Do not remove unsound mortar that extends more than half the depth of the masonry unit; consult Architect for direction.

F. Power-operated saws and grinders will be permitted for use on the joints with the approval of the Architect, only if the Contractor demonstrates the ability of the operators to use tools without damaging the masonry. If damage to the masonry is caused by the use of power tools, only chisels and mallets will be permitted for the remainder of the project.

1. Center-cut joints: If power operated tools are permitted by the Architect, these tools shall only be used to cut a single kerf in the center of the joints. Hand tools shall be used to remove the remaining mortar from sides of the joints.
2. Do not use power operated saws and grinders on joints less than 3/16 inch wide and less than 4 inches long, including all brick masonry head joints.

G. Completely remove sealant residues where present in joints indicated to receive repointing with mortar. Do not damage the edges of masonry units or widen joints.

H. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

3.04 MORTAR MIXING

A. Thoroughly mix mortar in quantities needed for immediate use using mechanical batch type mixer in accordance with ASTM C270. Add approximately half the required water and mix mortar for a minimum of five minutes, and then slowly add water as needed to reach the desired working consistency. Do not exceed mix time of ten minutes. A minimum amount of water shall be used to produce a workable consistency for the mortars intended purpose.
1. Where mortar is required in small batches of less than a cubic yard and the Architect specifically approves, mortar may be mixed in a clean vessel by hand or paddle mixer and electric drill. No plastic particles from mixing in plastic buckets will be permitted in any mortar.

B. After mixing, allow Portland cement mortars to sit for 20 minutes prior to use to allow for initial shrinkage.

C. Mortar for pointing shall be as dry a consistency as will produce a mortar sufficiently plastic to be worked into the joints.

D. Add only clean, potable water at the project site. Do not add sand, cement, lime, bonding agents, color admixtures, set accelerators, plasticizers, air entraining admixtures or other materials unless specifically authorized in writing from the manufacturer and approved by the Architect.

E. Use mortar within 1/2-hour of mixing, after which unused mortar shall be discarded. Do not re-temper mortars which have begun to set.

3.05 REPOINTING MASONRY

A. Rake out and repoint joints to the following extent:
1. All joints in areas indicated.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks can be penetrated at least 1/4 inch by a knife blade 0.027 inch thick.
4. Cracked joints where cracks are 1/16 inch or more in width and of any depth.
5. Joints where they sound hollow when tapped by metal object.
6. Joints where they are worn back 1/4 inch or more from surface.
7. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
8. Joints where they have been filled with substances other than mortar.
9. Joints indicated as sealant-filled joints.

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:
1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2 inch or not less than that required to expose sound, un-weathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.

3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
    a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without Architect's written approval based on approved quality-control program.
    b. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program.

D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

E. Pointing with Mortar:
1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing applicaiton so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to feather edge the mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
    a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
    b. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

F. Pointing with Sealant:
1. After raking out, keep joints dry and free of mortar and debris.
2. Clean and prepare joint surfaces according to Section 079200 - JOINT SEALANTS Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
3. Fill sealant joints with specified joint sealant according to Section 079200 - JOINT SEALANTS and the following:
    a. Install cylindrical sealant backing beneath the sealant, except where space is insufficient. There, install bond-breaker tape.
    b. Install sealant using only proven installation techniques that will ensure that sealant will be deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.
    c. Install sealant as recommended by sealant manufacturer but within the following general limitations, measure at the center (thin) section of the bead:

d. Fill joints to a depth equal to joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.
e. Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.
f. Do not allow sealant to overflow or spill into adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

4. Cure sealant according to Section 079200 - JOINT SEALANTS.

G. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.06 CURING

A. Cure joints after mortar has achieved initial set by maintaining in damp condition for at least 72 consecutive hours, including weekends and holidays.
1. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers. Cure using clean, potable water.
2. Increase the frequency of misting in hot and dry weather.
3. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.

B. Hairline cracking within the mortar or mortar separation from the edge of masonry units is unacceptable. Remove mortar and repoint.

3.07 INSTALLING SEALANT

A. After raking out mortar, keep joints dry and free of mortar and debris.

B. Clean and prepare joint surfaces. Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.

C. Fill sealant joints with specified joint sealant:
1. Install cylindrical sealant backing beneath the sealant. Where space is insufficient for cylindrical sealant backing, install bond-breaker tape.
2. Install sealant using only proven installation techniques that ensure that sealant is deposited in a uniform, continuous ribbon without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.
3. Install sealant as recommended in writing by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
a. Fill joints to a depth equal to joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.
4. Tool sealant to form smooth, slightly concave, uniform beads. Remove excess sealant from surfaces adjacent to joint.
5. Sanded Joints: Immediately after first tooling, apply aggregate to sealant, gently pushing aggregate into the surface of sealant. Lightly retool sealant to form smooth, slightly concave, uniform beads. Remove excess sealant and aggregate from surfaces adjacent to joint.
6. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to

eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mock-up.

3.08 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
   1. Do not use metal scrapers or brushes.
   2. Do not use acidic or alkaline cleaners.

B. Wash adjacent non-masonry surfaces. Use detergent and soft brushes or cloths.

C. Clean debris from roof, roof drains, and associated piping. Rinse off roof and flush out roof drains.

D. Clean debris and any mortar droppings from ledges and horizontal surfaces.

E. Sweep and rake adjacent pavement and grounds to remove debris. Where necessary, pressure wash surfaces at low pressure to remove mortar, dust, dirt, and stains.

F. Remove masking materials, leaving no residues that could trap dirt.

3.09 FIELD QUALITY CONTROL

A. Architect’s and Construction Manager's Project Representatives: Architect and Construction Manager will assign Project representatives to help carry out their responsibilities at the site, including observing progress and quality of portion of the work completed. Allow Architect’s and Construction Manager's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the work completed.

B. Notify Construction Manager's and Architect’s Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Construction Manager and Architect’s Project representatives have had reasonable opportunity to make observations of work areas at lift device or scaffold location.

END OF SECTION

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PART 1 GENERAL

1.01 RELATED SECTIONS

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: mortar for all concrete unit masonry, brick masonry and cast stone.
   1. Mortar for all concrete unit masonry, brick masonry and cast stone.
   2. Mortar for repointing joints.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 040121 - Masonry Restoration
   2. Section 040343 - Masonry Repointing
   3. Section 040523 - Masonry Accessories
   4. Section 042113 - Brick Masonry
   5. Section 079200 - Sealants

1.03 STANDARDS

A. All work of this section shall conform to industry standards and/or manufacturer’s recommendation.

B. ASTM C91 "Standard Specifications for Masonry Cement".

C. ASTM C109 "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars".

D. ASTM C144 "Standard Specification for Aggregate for Masonry Mortar".

E. ASTM C150 "Standard Specification for Portland Cement".

F. ASTM C207 "Standard Specifications for Hydrated Lime for Masonry Purposes".

G. ASTM C270 "Standard Specifications for Mortar for Unit Masonry".

H. ASTM C780 "Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry".

I. ASTM C979 "Standard Specification for Pigments for Integrally Colored Concrete".

J. ASTM C1506 "Standard Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters".

1.04 SUBMITTALS

A. Submit pursuant to Section 013300 - Submittal Procedures.

B. Submit pursuant to Section 016100 - Basic Product Requirements.

C. Submit certificates of compliance and manufacturer's technical data describing: cement, lime, sand and admixture products specified.

D. Submit manufacturer's technical data describing integral coloring specified.

E. Submit small mortar samples depicting integral coloring. Provide manufacturer's entire range of available colors. Plastic samples representing available colors are not acceptable.

F. Mortar mix designs for each type of mortar. Include description of type and proportions of ingredients.
   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.

G. Submit results of tests of field specimens.

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 manufacturer's published instructions.

B. Protect against moisture exposure and damage.

PART 2 PRODUCTS

2.01 MORTAR MATERIALS

A. Portland Cement: ASTM C150, Type I or Type II.
   1. Provide white cement for integral coloring where required to obtain desired mortar color.

B. Mortar Sand: ASTM C144
   1. Color: Provide natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
   2. For pointing mortar, provide sand with rounded edges.
   3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

C. Water: Clean, potable and salt free.

D. Lime: ASTM C207, Type S mortar.

E. Provide all cement products from one manufacturer.

2.02 ADMIXTURES

A. Admixtures containing calcium chlorides are prohibited.

B. Apply at dosage recommended by the manufacturer.

2.03 INTEGRAL COLORING

A. Product: dry mixture of pure, non-fading, alkali-resistant iron-oxide pigments possessing uniform dispersion characteristics specifically intended for mixing into mortar and complying with ASTM C979.

B. Color to match existing adjacent mortar. Color to be approved by Architect.

2.04 MORTAR MIX

A. Prepare mortar mixes pursuant to "Property Specification Requirements" of ASTM C270 for types indicated on Drawings and herein specified. Do not exceed manufacturer's recommended pigment to cement ratio in colored mortar.

B. Exterior Concrete Unit Masonry (above grade)
   1. Mortar:
      a. Type S (minimum average compressive strength at 28 days: 1,800 lb./sq. in.).
      b. Mix: Portland cement/lime/sand.
   2. Admixture:
      a. Coloring pigments, color as selected by Architect.
      b. Must contain admixture for waterproofing
         1) Submittals must specify water repellent agent.
         2) Submit product literature for approval prior to using mortar on any finished area.

C. Exterior Brick Masonry (above grade)
   1. Mortar:
      a. Type N
         1) Proportion Portland cement, Lime and Sand in a 1:1:6 ratio

2. Admixture:
    a. Coloring pigments, color as selected by Architect.
    b. Submit product literature for approval prior to using mortar on any finished area

D. Interior Concrete Unit Masonry
1. Mortar:
    a. Type S (minimum average compressive strength at 28 days: 1,800 lb./sq. in.).
    b. Mix: Portland cement/lime/sand.
    c. Color: Standard gray
        1) Standard gray at CMU to be painted.

E. Tests
1. Prepare mix designs and conduct tests using a recognized laboratory.

PART 3 EXECUTION

3.01 MIXING

A. Mix mortar by methods that will ensure accurate proportioning of all required ingredients to a uniform consistency.

B. Mechanically mix between 3 to 5 min. Hand mixing is prohibited.

C. Select ingredients that are compatible.

D. Do not combine two air entraining materials within same mortar mix.

3.02 RETEMPERING

A. Use mortar within 2-1/2 hours of initial mixing.

B. Discard unused mortar after it has begun to set. Do not re-temper mortar that has begun to set.

3.03 ADMIXTURES

A. Mix admixtures into mortar pursuant to manufacturer's published instructions.

3.04 INTEGRAL COLORING

A. Provide integral coloring to mortar for all exterior walls.

B. Mix into mortar pursuant to manufacturer's published instructions.

3.05 FIELD QUALITY CONTROL

A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work area, as needed to perform inspections.

B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests, inspections and prepare test reports:
1. Payment for these services will be made by Owner.

C. Mortar Tests: Test each type of mortar in accordance with ASTM 780, testing with same frequency as masonry samples.
1. Test three samples for each 5,000 square feet of wall area or portion thereof; test one sample at 7 days and two samples at 28 days for each set.

END OF SECTION

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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 Specifications, apply to work of this Section.

1.02 SUMMARY

A. This Section includes the following masonry related items:
   1. Metal horizontal joint reinforcement for masonry.
   2. Wall weep and ventilation for masonry veneer.
   3. Masonry veneer anchors.
   4. In wall cavity mortar netting with insect barrier.
   5. Thru wall flashing.
   6. Repair and Restoration Anchors.
   7. Masonry Control Joints.
   8. Grout Screen.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 040121 - Masonry Restoration.
   2. Section 040343 - Masonry Repointing.
   3. Section 040513 - Mortar.
   4. Section 042113 - Brick Masonry.

1.03 STANDARDS

A. All work of this section shall conform to industry standards and/or manufacturer’s recommendations.

B. ASTM A82 "Standard Specification for Steel Wire, Plain, for Concrete Reinforcement".

C. ASTM A153 "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware".

D. ASTM A641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire".

E. ASTM A951 "Standard Specification for Masonry Joint Reinforcing".

F. ASTM D2287 "Standard Specification for Non-rigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds".

G. "Building Code Requirements and Specification for Masonry Structures" and Companion Commentaries (latest edition) (ACI-530/530.1; ASCE-5; TMS-402/602).

1.04 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.05 SUBMITTALS

A. Submit pursuant to 013300 - Submittal Procedures.

B. Submit pursuant to 016100 - Basic Product Requirements.

C. Product Data: Provide manufacturer's cut sheets clearly hi-liting or otherwise indicating choices in size, gauge, color, material, etc. for the following products:
   1. Horizontal joint reinforcing.
   2. Veneer anchors.
   3. Masonry anchors to structural steel.
   4. Movement joint products.
   5. Grout screen.
   6. Through-wall flashing, drip edge and termination bar.

7. Cell vents.
8. Mortar netting.
9. Rigid ties.
10. Expansion and adhesive anchors.

D. Submit certificates of compliance and manufacturer's technical data for but not limited to: horizontal joint reinforcing, movement joints products, anchors, thru-wall flashing, mortar netting, wall ventilation and rigid ties.

1.06 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.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Pursuant to manufacturer's published instructions.

B. Protect against moisture exposure and damage.

C. Store masonry accessories to prevent corrosion and accumulation of dirt, oil or any other foreign substances.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hohmann & Barnard, Inc., 150 Motor Parkway, Suite 410, Hauppauge, NY 11788. Phone: (800) 645-0616.

B. Heckmann Building Products, 110 Richards Ave., Norwalk, CT 06854. Phone: (800) 621-4140.

C. WIRE-BOND, 400 Roundtree Road, Charlotte, NC 28217. Phone: (800) 849-6722.

D. Architect approved equivalent.

2.02 HORIZONTAL JOINT REINFORCEMENT WITH TIES OR ANCHORS

A. Description: Two or more parallel longitudinal deformed rods, weld connected with transverse cross rods which forms a ladder design.

B. Provide with out-to-out longitudinal rod spacing two inches less than out-to-out of CMU wythe width.

C. Exterior Application:
1. Side Rods: Two rods, 3/16-inch diameter.
2. Cross Rods: 9 gauge.
3. Finish: hot dip galvanized 1.5 oz. per sq. ft., ASTM A153, Class B-2.
4. Pintle: super-heavy-duty eyelets, pintles are flattened and serrated.
   a. Embed pintles (hooks) in the mortar joint and extend into the veneer a minimum of 1 ½", with at least 1" cover to the outside face.

D. Products: #270 ML Adjustable Eye-Wire by Hohmann & Barnard, Inc., (www.h-b.com) Basis of Specification or Architect approved equivalent.

2.03 HORIZONTAL JOINT REINFORCEMENT WITHOUT TIES OR ANCHORS

A. Description: two or more parallel longitudinal deformed rods weld connected to a continuous diagonally oriented cross rod which forms a "ladder" design.

B. Provide with out-to-out side rod spacing two in. less than out-to-out total wall system width.
1. Lap side rods minimum of 6" at splices u.o.n.

C. Exterior Application:
1. Side Rods: 2 min., 3/16-inch diameter.
2. Cross Rods: 9 gauge.

3. Finish: hot dip galvanized 1.5 oz. Per sq. ft., ASTM A153, Class B-2.

D. Interior Application:
1. Side Rods: 2 min., 3/16-inch diameter.
2. Cross Rods: 9 gauge.
3. Finish: mill galvanized minimum of .10 oz. psf.

E. Products: #220 Ladder Mesh by Hohmann & Barnard, Inc. (www.h-b.com), Basis of Specification or Architect approved equivalent.

2.04 VENEER ANCHORING SYSTEM (HB-DW-10HS)

A. Description: vertically adjustable mechanical anchoring system for anchoring masonry veneer to existing wall construction.

B. Provide 12-gauge HB-DW-10HS with 3/16-inch diameter Vee Byna-Tie as manufactured by Hohmann & Barnard, Inc. or Architect approved equivalent.
1. Embed Vee Byna-Tie in the veneer mortar joint a minimum of 2”, with at least 1” cover to the outside face.

C. Finish: hot dip galvanized.

2.05 MASONRY RESTORATION ANCHORING SYSTEM TO EXISTING BUILDING CMU

A. Description: Masonry Fastener assembly for refacing a brick veneer to existing masonry construction with a minimum 3/4" cavity.

B. Product: Spira-Lok® Repair and Restoration Anchors by Hohmann & Barnard, Inc. or Architect approved equivalent.
1. Finish: Stainless Steel Type 304.
2. Diameter: 8mm.

2.06 GROUT SCREEN

A. Hohmann & Barnard or Architect approved equivalent.
1. MGS Mortar/Grout Screen based on CMU thickness.
2. Use where required to maintain grout in filled cells.

2.07 THROUGH-WALL FLASHING (BASE FLASHING, THRU-WALL FLASHING)

A. Flexible Flashing: For flashing not exposed to the exterior, use the following self adhesive (clear), non-asphalt composite membrane with a minimum thickness of 40 mils, unless otherwise indicated:
1. Textroflash™ Flashing by Hohmann & Barnard, Inc.
2. Flex-Flash® Flashing by Hohmann & Barnard, Inc.
3. Mas-N-Flash by WIRE-BOND.
4. CCW-705-TWF by Carlisle Coatings & Waterproofing Inc.
5. Architect approved equivalent guaranteed not to "drool" when exposed to UV or heat.

B. Flashing Primer: Use water-based self-adhering flashing primer as recommended by flashing manufacturer.

C. Stainless Steel Drip Edge (Drip Plate):
1. 26-gauge Type 304 stainless steel drip plate, 2-1/2” wide with a 3/16” hemmed drip.
2. Provide factory formed inside and outside corners.

D. Termination Bar (top):
1. 26 gauge x 1-1/2”, 304 stainless steel with 3/8" flange on top to receive field applied sealant.

2.08 WALL DRAINAGE AND VENTILATION

A. Manufacturers:
1. Quadro Vent™ by Hohmann & Barnard, Inc.

2. #3601 Cell Vent by WIRE-BOND.
3. #85 Cell Vent by Heckmann Building Products.
4. CavClear® Weep Vents by CavClear.
5. Architect approved equivalent.

B. Application:
1. Install directly on top of through wall flashings **and** at highest point in cavity at 24" o.c. in brick veneer conditions and 32" o.c. in cast stone and ACMU veneer. Install at window sills & heads, door heads louvers and other locations as shown on the Contract Drawings.
2. Color: to be selected by Architect.
3. If cell vent appears in profiled unit (Bullnose, chamfered, etc.) trim cell vent to profile shape.

2.09 IN WALL CAVITY MORTAR NETTING

A. Description: 90% open polymeric mesh with insect barrier to allow unobstructed passage of air and water as base of wall cavity.

B. Manufacturer:
1. Mortar Net Solutions™, 6575 Daniel Burnham Drive Suite G, Portage, Indiana 46368. Phone: (800) 664-6638. Basis of Specification.
2. MASONPRO, Inc., 43300 Seven Mile Road, Northville, MI 48167. Phone: (800) 659-4731.
3. Hohmann & Barnard, Inc., 150 Motor Parkway, Suite 410, Hauppauge, NY 11788. Phone: (800) 645-0616. Mortar Trap™.
4. Architect approved equivalent.

C. Product: Mortar Net® with Insect Barrier, by Mortar Net Solutions™, 10" high by thickness required.

D. Match product size to cavity size. Cavity should be no more than ¼" wider than 1" thick material and 2" thick material, and 0.4" thick material should touch both the outer wythe and the inner wall. For cavities larger than 2", place rigid insulation of sufficient height to extend at least 6" above the top of the Mortar Net® with Insect Barrier against the outside of the inner wythe and of appropriate thickness to reduce the cavity to the appropriate size or add additional layers of Mortar Net® to fill width of cavity.

2.10 COMPRESSIBLE FILLER

A. Premolded filler strips complying with ASTM D1056, Grade 2A 1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Products:
1. NS Closed Cell Neoprene Sponge as manufactured by Hohmann & Barnard, Inc.
2. #3300 Expansion Joint as manufactured by Wire-Bond.
3. Architect approved equivalent.

2.11 EXPANSION BOLTS (ATTACHING STEEL MEMBERS TO MASONRY WALLS)

A. Description: Stud type with a single piece three section wedge and zinc plated in accordance with ASTM B633 or where specified, type 304 or type 316 stainless steel. See Contract Drawings for locations where stainless steel is required. Anchors shall be installed in drilled holes per manufacturer's recommendations.

B. Product: Hilti Kwik Bolts, diameter as specified, by Hilti Corp. or Architect approved equivalent.

2.12 ADHESIVE ANCHOR BOLTS (ATTACHING STEEL MEMBERS TO MASONRY ELEMENTS)

A. Description: Threaded anchor rods, nut and washer, a cylindrical mesh screen tube and an injectable adhesive (components A and B) material. Screen tube and anchors shall be installed in drilled holes and per manufacturer's recommendations. Anchor rods supplied in accordance with ASTM A 36, or if required: ASTM F 593 (AISI 304 stainless steel). Nuts shall be furnished to

meet the requirements of the above anchor rod specifications. Anchors rods (non-stainless steel), nuts and washers to be zinc plated in accordance with ASTM A 153.

B. Product: Hilti HIT-HY 10 PLUS, diameter as specified, by Hilti Corp. or Architect approved equivalent.

PART 3 EXECUTION

3.01 GENERAL

A. If more than one value or requirement is specified, see Contract Drawings for location.

3.02 HORIZONTAL JOINT REINFORCEMENT

A. Place horizontal joint reinforcing as follows:
   1. In solid wall panels, for interior and exterior walls, place at a vertical spacing of 16 in. on center vertically.
   2. In exterior parapets, place at a vertical spacing of 8 in. on center vertically.

B. Place horizontal joint reinforcement in:
   1. All concrete unit masonry walls.

C. Place horizontal joint reinforcing in the two (2) bed joints above and below window, louver, door wall openings, and training openings extending a minimum of 24" beyond the opening (except at vertical control joints). At other special conditions, place horizontal joint reinforcement as described in manufacturer's published instructions and as illustrated on Contract Drawings.

D. Lap side rods at each end joint a minimum of 6 in. for normal shrinkage stresses.

E. Install prefabricated corner and tee assemblies at each wall corner and intersection.

F. Miter and butt end joints are prohibited.

G. Place horizontal joint reinforcement in approximate center of out-to-out wall assembly and assuring a 5/8 in., minimum, mortar coverage on exterior face.

H. Install horizontal joint reinforcement continuous, terminating only at vertical control joints.

I. Cut, form and seal all inside and outside corners.

3.03 THROUGH-WALL FLASHING INSTALLATION

A. Install flashing, drip edge, and termination bar in accordance with manufacturer’s printed instructions at all exterior conditions.
   1. Use primer as recommended by flashing manufacturer.
   2. Install flashing in sections of 8' or less into primed surfaces.
   3. Use a roller to firmly press flashing onto surface without air pockets.
   4. Seal all non water shedding edges as recommended by flashing manufacturer.
   5. Do not leave flashing exposed to UV light for more than 60 days.

B. Mortar shall be bedded above and below the flashing.

C. Flash all shelf angles including but not limited to lintels, bond beams, sills, wall bases and any other obstructions to natural flow of water within the wall cavity.

D. Install end dams a minimum of 2” high U.N.O. at all shelf angles, sills and other ends.

E. Lap all flashing joints a minimum of 3” and seal with manufacturers approved mastic. Lap all drip edge a minimum of 3" with sealant beads as recommended by manufacturer.

F. Any penetration of the flashing must be sealed.

G. All thru wall flashings to rise a minimum of 12” to the interiors. Use termination bar and sealant at exterior sheathing and CMU.

H. Fasten termination bar to stud wall construction at 16" o.c. maximum and at 8" o.c. maximum for CMU back-up wall construction.

I. At base of masonry walls where exterior finish grade changes, follow grade changes by lowering or raising base flashing as required in 8" steps to follow the exterior grade.

3.04 MORTAR NET

A. Install as per manufacturer's instructions.

B. Install continuous length of mortar net immediately above all through-wall flashings in masonry veneer applications.

3.05 EXPANSION/CONTROL JOINTS IN MASONRY VENEER

A. Install Joint Stabilization Anchors at 2'-0" o.c. vertically in veneer expansion/control joints. Field bend joint stabilization anchors where CJ/EJs occur at perpendicular veneer. Provide NSTA - Closed Cell Neoprene Sponge in veneer control joints.

END OF SECTION

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Drawings and general provisions of the Agreement, including General Conditions and Division 01 of the Project Manual, apply to work of this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Brick Masonry
      a. For the infilling of existing exterior walls where brick in-fills are required.
      b. For replacing existing brick that is either missing or severely damaged as identified on the Contract Drawings.
      c. Exterior brick exposed to view: Use salvaged brick if available. Otherwse use new matching brick. Back-up brick in exterior wall reconstruction: Use new brick.

B. Related Sections: The following Sections contain requirements that relate to the Section.
   1. Section 040120 - Maintenance of Unit Masonry
   2. Section 040121 - Masonry Restoration
   3. Section 040343 - Masonry Repointing
   4. Section 040513 – Mortar
   5. Section 040523 – Masonry Accessories
   6. Section 079200 – Sealants

1.03 STANDARDS

A. ASTM C62 "Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)".

B. ASTM C67 "Standard Test Methods of Sampling and Testing Brick and Structural Clay Tile".

C. ASTM C216 "Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)".

D. BIA Technical Notes on Brick and Tile Construction.

1.04 SUBMITTALS

A. Submit pursuant to Section 013300 – Submittal Procedures

B. Product Data:
   1. Submit product data including test results on each type of new brick required.
   2. Submit product data for proposed cleaning product including instruction for proper application and use.

C. Samples for Verification & Approval
   1. 5 brick strap for each type or color of brick specified showing extremes of variation in color and texture.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with Technical Notes on Brick and Tile Construction, by Brick Institute of America (BIA), except as more stringently required in the Contract Documents.

1.06 STORAGE AND PROTECTION

A. Store new brick and salvaged brick off ground, under cover, to prevent wetting and contamination by weather, mud, dust and materials likely to cause staining.

1.07 PROJECT/SITE CONDITIONS

A. At end of day, or during a shutdown, protect top surface of all masonry to prevent rain from entering the masonry. Install protection, adequately anchored, to prevent water intrusion to cover top surface and extend a minimum of 2 ft down all sides of masonry.

B. Brace walls according to NCMA and ANSI.

C. Prevent and remove immediately any mortar, grout and soil droppings that come in contact with masonry.

D. Protect base of walls from rain-splashed mud and mortar by means of coverings on ground and over wall surface.

E. Cold Weather Requirements: Comply with National Concrete Masonry Association (NCMA) TEK Spec #3-1C “All Weather Concrete Masonry Construction.”.

PART 2 PRODUCTS

2.01 FACING BRICK

A. Face Brick: Provide face brick, including specially molded, round, cut, or sawed shapes wehre required to complete masonry restoration work matching existing masonry.
   1. Provide units with colors, color variation within units, surface texture, size, and shape to match existing brickwork.
      a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
   2. Special Shapes:
      a. Provide specially molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position and where shapes produced by sawing would result in sawed surfaces being exposed to view.
      b. Provide specially ground units, shaped to match patterns, for arches and where indicated.
      c. Mechanical chopping or breaking brick, or bonding pieces of brick together by adhesive, are not acceptable procedures for fabricating special shapes.
   3. Tolerances as Fabricated: Comply with tolerance requirements in ASTM C216, Type FBS or to match existing brick masonry tolerances.

B. Salvaged Brick: When available use salvaged brick that are whole and in good condition.

2.02 BRICK CLEANER

A. Non-Acidic cleaner specific for cleaning brick and removing efflorescence as recommended by brick manufacturer for brick being supplied.

B. See Specification Section 040120 - Maintenance of Unit Masonry.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine other construction, which supports or connects with masonry work. Where such construction as footings and shelves are not sound or level, where anchorage devices have not been installed, where interferences exist, or where there are other conditions unsuitable for proper installation or performance of the masonry, do not start masonry work until defective earlier construction has been completed or corrected.

3.02 CONDITIONING BRICK

A. Wet brick with absorption rate greater than 20 grams/min/30 sq. in., as determined by ASTM C67, so that rate of absorption when laid does not exceed this amount.

B. Do not dip individual brick in water before laying. Instead, play a hose on piled brick until water runs from brick. Wet down 1 day before brick are to be used. In hot weather, wet down 2 to 4 hours before brick are to be used.

3.03 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
   1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that sourounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

D. Remove in an undamaged condition as many whole bricks as possible.
   1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
   2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
   3. Store brick for reuse. Store off ground, on skids, and protected from weather.
   4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.

F. Replace removed damaged brick with other removed brick in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.

G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
   1. Maintain joint width for replacement units to match existing joints.
   2. Use setting buttons or shims to set units accurately spaced with uniform joints.

H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67/C67M initial rates of absorption (suction) of more than 30 gr/30 sq. in. per min. (30 g/194 sq. cm. per min.). Use wetting methods that ensure that units are nearly saturated, but surface is dry when laid.
   1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
   2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
   3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.04 REANCHORING VENEERS

A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Install at not more than 16 inches o.c. vertically and 32 inches o.c. horizontally unless otherwise indicated. Install atlocations to avoid penetrating flashing.

B. Recess anchors at least 5/8 inch from surface of mortar joint and fill recess with pointing mortar.

3.05 PAINTING STEEL UNCOVERED DURING THE WORK

A. Inspect steel exposed during masonry removal. Where the Architect determines that it is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
   1. Remove paint, rust, and other contaminants according to SSPC-SP 3, "Power Tool Cleaning", as applicable to meet paint manufacturer's recommended preparation.

2. Immediately paint exposed steel with two coats of anti-rust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).

B. If on inspection and rust removal, the cross section of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3.06 COURSING AND BOND

A. Course brick to match existing brick coursing.

B. Layup brick with approximately 3/8 in. bed joints, uniformly adjusted to produce the specified coursing. Make head joints the same width as bed joints.

C. Layup brick in stretcher, header, rowlock, bull header (stretcher rowlock), soldier, or sailor position with only good faces and good ends showing. Cut brick to make headers in veneer and show good end only.

D. Shapes: Provide shapes as indicated on Drawings, with finished faces at all locations where they will be visible in the Work. Do not cut brick to make shapes.

E. Finish visible brick joints using nonrusting tools to form hard impervious surface by hard tooling to a concave profile "U" joint.

F. Compress joints and cut flush in unexposed work except at joints below grade. Hard tool joints below grade to a concave profile.

3.07 INSTALLATION

A. At brick infills, select brick from salvaged brick that closely matches existing, adjacent brick. Salvaged brick to only be used for brick appearing in exterior face of in-fill.

B. Lay brick plumb and true to lines, with level courses. Line up head joints vertically. Use no more than one cut closure in any length of wall. Line up closures vertically.

C. Layup brick with completely filled mortar joints. Do not furrow bed joints. Butter end of brick with sufficient mortar to fill head joint, then shove in place. Rock closures in place with head joints thrown against two adjoining brick in place.

D. Tap each unit to line and level as it is placed. Do not disturb any unit once in place except to completely remove and set in a fresh bed of mortar.

E. Do not pound corners and jambs to fit stretcher units after they have been set in position. Where an adjustment must be made after mortar has started to harden, remove mortar and replace with fresh mortar.

F. Make all cuts with power masonry saw. Do not use Sawcut faces in exposed work.

G. Lay up only brick, which have no chipped, cracked or discolored exposed faces. Layup with good face showing, lip (if any) always down, frog (if any) always up. Where flat side is shown, provide a brick with flat un-torn side matching other brick faces, without frog, or core holes.

H. Tool joints when thumbprint hard, compressing mortar tightly against both sides of joint. Make head joints match profile of bed joints.

3.08 FLEXIBLE IN WALL FLASHING

A. Place wall flashing over a thin bed of mortar, always sloping flashing slightly to exterior. Place mortar over flashing to bed brick course above it.

B. Turn wall flashing at least 8 in. up behind brick and anchor top edge as per detail shown in drawings.

C. Tape, or seal with asphalt cement, all penetrations in wall flashing. Extend wall flashing around outside of structural columns. Extend wall flashing at least 4 in. beyond lintels and sills and turn

up ends to form a pan, which directs moisture to exterior. Lap wall flashing joints at least 4 in. Extend wall flashing to within 1/4 in. of exterior of mortar joint.

3.09 OTHER WORK

A. Build in lintels, door frames, windows, flashing, insulation, reglets, inserts, anchors, blocking, sleeves, boxes, cabinets, piping, conduit, and other items whether provided as part of masonry work, as preparation for other work, or furnished by other trades.

B. Fill steel door frames in masonry walls with grout.

C. Provide passage for electrical and mechanical lines. Allow and aid placement in walls where lines would be exposed. Cut neat holes for in wall switches and cabinets. Make provisions for passage of lines, and other chases and openings, during laying up of masonry so that later cutting is not necessary. Fill holes after lines and boxes are in place.

D. Maintain sealant clearances at door, window, and other openings.

E. Provide lintels at all openings in masonry work, as needed to form openings for windows, louvers, frames, in-wall equipment, through wall ducts and piping, and as otherwise needed to support heads of all openings over 8 in. wide.

3.10 CONTROL OF MOVEMENT

A. For expansion joints, leave full width of joint free of masonry, mortar and reinforcement, ready for backup material and sealant.

B. For control joints, insert control joint material and leave joint free of masonry and reinforcement.

C. If control joints are not shown, place them vertically not more than 24 ft on center, within 2 ft of building corners, and at lines of weakness such as at steel columns, changes in building height, and at each side of openings over 8 ft high.

D. Do not butter masonry units to steel members, except where masonry bears on steel. Maintain 1/2 in. clearance. Fill vertical clearances with 1/2 in. semi-rigid fiberglass or other sort, incombustible board material.

E. Build nonbearing partitions to a distance 3/8 to 3/4 in. from structural soffit above. When structure above has deflected from building loads placed upon it, wedge partition to structural soffit with metal or slate wedges and fill top joint with mortar.

F. Straighten and position anchors and protruding reinforcement, which were placed in, reinforced brick lintel concrete to bond fine grout to concrete beam.

3.11 PROTECTION

A. Wall covering:
   1. Cover tops of partially completed walls with strong, non-staining, waterproof membrane, securely held in place, extending at least 24 in. down both sides of wall at start of rain, and at end of each day's work on wall.
   2. Clamp protective membrane in place using spring wire clamps.

B. Load application:
   1. Do not apply dead, live floor, or roof loading for at least 24 (twenty-four) hours after building masonry columns or walls.
   2. Do not apply concentrated loads for at least 3 days after building masonry columns or walls.

C. Staining:
   1. Prevent mortar, grout, and cleaning agents from adhering to, staining or deteriorating masonry and other surfaces to be left exposed or painted.
   2. Remove mortar, grout, and cleaning agents from masonry and other surfaces daily. Remove them from sensitive surfaces such as aluminum and glass immediately.

3. Protect sills, ledges, and projections from mortar droppings by means of taped paper guards or a layer of sand.
4. Protect door and window frames during masonry construction. Maintain in plumb, square, true position.

3.12 REPAIR OF DEFECTIVE WORK

A. Remove stained and damaged brick and replace with new units in fresh mortar bed, of color and tooling matching surrounding work. Repair voids and other defects in mortar joints.

3.13 CLEANING BRICK

A. Start cleaning late in the work, after mortar is thoroughly cured.

B. Dry clean walls before wetting. Remove large particles of mortar with wood paddles and scrapers. Use chisel or wire brush only when wood implements do not work.

C. Soak wall with copious amounts of clean water from hose, flushing off loose mortar and dirt in the process.

D. Scrub walls with detergent cleaning agent, using stiff fiber brush.

E. Rinse off all detergent, dirt, and mortar crumbs using clean water from hose.

F. Do not use any acid or acid compounds in cleaning brick masonry.

G. No air blast or sand blast cleaning of masonry shall be allowed.

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 2024).

D. ASTM D5456 - Standard Specification for Evaluation of Structural Composite Lumber Products; 2024.

E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2022.

F. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   1. Currently: 2025 NYS Building Code Series.

G. PS 1 - Structural Plywood; 2009 (Revised 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: AWPA 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 D5664 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 2025 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-preservative-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-preservative-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 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. Polyisocyanurate foam insulation with foil facers
   2. Extruded Polystyrene foam board insulation.
   3. Mineral-wool blanket insulation.
   4. Vapor retarders.

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 POLYISOCYANURATE BOARD INSULATION

A. Acceptable Manufacturer: Insulating panels shall be XCI products produced by Hunter Panels, 15 Franklin Street, Portland, Maine 04101. Phone: (207) 761-5678 or (888) 746-1114. Fax: (877) 115-1769. E-mail: info@hpanels.com.
   1. Architect approved equivalent.

B. Board Insulation with Foil Facers: Hunter Panels Xci Foil (Class A) complies with ASTM C1289 and ASTM E84 Class A (25 or less) Panels are a high thermal resistive rigid insulation panel composed of a closed cell polyisocyanurate foam core bonded on both sides to reinforced foil facers.
   1. Type: ASTM C1289, Type I (Foil-facers on each side of foam core)
      a. Grade 3 (25 psi).
      b. Panel Size:
         1) 4 feet by 8 feet (1220 mm by 2440 mm) and 4 feet by 4 feet (1220 mm by 1220 mm)
      c. R Value: ASTM C518 at 75 degrees F (23.9 degrees C). Provide thickness requirements indicated on the drawings
         1) 2.0 inches (51 mm) / R Value 13.0 and 4.0 inches (100 mm) / R Value 25.2

C. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.

D. Panel fasteners shall be corrosion resistant type as approved by the panel manufacturer. Length of fasteners shall be as recommended by the panel manufacturer

2.02 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E84, Class A.
   1. Products:
      a. DuPont de Nemours, Inc. Chemical Company; STYROFOAM HIGHLOAD 100: www.DuPont.com/#sle.
      b. Owens Corning Corporation: FOAMULAR NGX 1000(100 psi compressive strength): www.ocbuildingspec.com/#sle.
      c. Substitutions: See Section 016100 - Product Requirements and Section 012500 - Substitution Procedures.
   2. Type V: 100.0 psi (Compressive strength), 3.00 pcf (Density) minimum.
   3. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
   4. Type and Thermal Resistance, R-value: Type V, 5.0, (0.88) per 1 inch thickness at 75 degrees F mean temperature.

B. Phenolic Foam Core Board Insulation: Phenolic foam core insulation boards with a glass-tissue-based facing on the back surface and a composite foil facer on the exterior surface. Provide type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Kingspan Kooltherm K12 Framing Board.
b. Architect approved equivalent.

2. Compressive Strength: Minimum ASTM D1621. Compressive strength at 10% compression:100 kPa (14.5 psi) min.

C. Rigid Vacuum-sealed Insulation Panel encased and sealed in a thin gas-tight envelope providing high thermal resistance with reduced panel thickness requirements. System shall incorporate compatible rigid insulation panels for areas requiring panel modifications and/or penetrations to complete the thermal envelope. The installation shall be coordinated with the manufacturer's design support team to enable optimal and efficient use of the VIP panel systems.

1. Panels shall be manufactured under a management system certifies the following:
   a. ISO 9001:2015 (Quality Management Systems, Requirements).
   b. ISO 14001:2015 (Environmental Management Systems, Requirements).
   c. ISO 45001:2018 (Occupational Health and Safety Management Systems, Requirements).
   d. ISO 50001:2018 (Energy Management Systems, Requirements).
2. Panels shall meet the following ASTM standards:
   a. ASTM C1667
   b. ASTM C165
   c. ASTM D2126
3. Physical Characteristics:

Property	Test Method	Result
Nominal Thickness		0.94 inches (24 mm)
Dimensions: Width Length		 22.4 inches (570 mm) 24.0 inches (570 mm) or 48.0 inches (1220 mm)
Nominal Panel Mass 20 mm thickness 25 mm thickness 30 mm thickness 35 mm thickness 40 mm thickness		 0.82 p.s.f. / 4 kg/sq.m. 1.02 p.s.f. / 5 kg/sq.m. 1.25 p.s.f. / 6 kg/sq.m. 1.43 p.s.f. / 7 kg/sq.m. 1.64 p.s.f. / 8 kg/sq.m.
Compressive Strength, Min. (psi) @ 25% deformation	ASTM C165	34.6 psi (Panasonic)
Dimensional Stability 20 mm (0.79 in.)-50 mm (1.97 in) Length max. Width max.	ASTM D2126	 0.5% 0.6%
Density	BS EN 1602	10.6-13.10 pcf / 170-210 kg/cm (Kingspan)
Density	ASTM C1667	18.08 pcf (Panasonic)
Thermal Resistance (Kingspan) 0.79 in. / 20 mm	ASTM C1667	R - value (Avg. based on panel size) 22

0.98 in. / 25 mm 1.18 in. / 30 mm 1.57 in. / 40 mm 1.97 in. / 50 mm		28 33 46 57
Thermal Resistance (Panasonic) 0.94 inches (24 mm)	ASTM C1667	R-values 66 (COP) / 34.74 (Average)
Flame Spread Index	ASTM E84	Class A (25)
Smoke Development Index	ASTM E84	Clas A (10)

4. Manufacturer / Product: Panasonic / ADVANC-R and Kingspan / OPTIM-R or Architect approved equivalent.
5. Adhesive: See Roofing manufacturer's recommended adhesive for the Total Roof System warranty specified.

D. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

E. Tape joints in rigid insulation with Henry Blueskin SA or equivalent material as recommended by the approved insulation manufacturer.

2.03 MINERAL-WOOL BLANKET INSULATION

A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
3. Products:
   a. Johns Manville; MinWool Sound Attenuation Fire Batts: www.jm.com/#sle.
   b. Knauf Insulation; EcoBatt Insulation: www.knaufinsulation.com/#sle.
   c. ROCKWOOL (ROXUL, Inc); AFB evo™: www.rockwool.com/#sle.
   d. Thermafiber, Inc; SAFB FF: www.thermafiber.com/#sle.
   e. Owens Corning.- Thermafiber® RainBarrier HD (R-4.3 per inch, 6.0 pcf.)
4. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 40 percent.

B. Mineral-Wool Blanket Cavity Insulation: CAVITYROCK Black; ASTM C612 Type IVB, Class A (faced surface with a flame-spread index of 25 or less per ASTM E84);
1. Complies with NFPA 285 requirements for wall assemblies.
2. Size: 24 inches wide as indicated on the drawings x 48 inch lengths.
3. Thickness: 3 inches (76 mm) or as indicated on the drawings.
4. Edges: Square
5. Density:
   a. Outer layer: 6.2 pcf, ASTM C612.
   b. Inner layer: 3.8 pcf, ASTM C612.
6. R value: 4.3 per inch (1 and 2 inch thick products) and 4.3 per inch for 2.5 to 6 inch thicknesses.
7. Fungi Resistance: Zero mold growth when tested in accordance with ASTM C1338.
8. Moisture Resistance: Absorption of less than 0.03 percent by volume.
9. Water Vapor Permeance: 27 perm (1555 ng/(Pa s sq m)), maximum, at 1 inch (25 mm) thick when tested in accordance with ASTM E96/E96M, desiccant method.

10. Metallic Corrosion Resistance: Noncorrosive/passed, when tested in accordance with ASTM C665 for steel, and ASTM C795 for stress corrosion cracking tendency of austenitic stainless steel.
11. Melting Point: 2,150 degrees F (1177 degrees C), minimum.
12. Note: Provide CAVITYROCK BLACK where indicated on the drawings and at all Rainscreen applications.

2.04 SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Polyurethane Foam Insulation: ASTM C1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84. Install where noted on the drawings.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. BASF Corporation.
      b. Gaco Western Inc.
      c. SWD Urethane Company.
   2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.05 THERMAL BARRIER

A. Intumescent Coating for SPF Insulation: DC315 Low VOC intumescent coating providing a 20 minute thermal barrier over SPF insulation in accordance with NFPA 286 and UL1715; AC456 compliant to meet IBC and IRC requirements; ASTM E84 - Flame spread 0 Smoke Developed 10.; ASTM E2768 - 30 minute ignition resistant material. Material shall cure by coalescence and be Spray applied at 24 mils (WFT), 67 % solids, Flat finish. Color: White.
   1. Manufacturer: International Fireproof Technology Inc. Tel.: (949)975-8588 or approved equal

2.06 VAPOR RETARDERS - LOW PERMEANCE

A. Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating of 0.0507 perm.
   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. Raven Industries Inc.; DURA-SKRIM 6WW.
      b. Reef Industries, Inc.; Griffolyn T-65.
      c. Stego Industries, LLC StegoWrap 15 mil
      d. or approved equal.

B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

D. Single-Component Nonsag Urethane Sealant: ASTM C920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.

E. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

F. Foil Type Wall Vapor Barriers: Foil faced, scrim-reinforced kraft Vapor Barrier material, ASTM C1136, Type II, IV; with 0.0003 inch Aluminum Foil face, 0.0001 inch Elastomeric Polymer Barrier Coating, Tri-directional fiberglass reinforcing, flame resistant adhesive and 0.01 lb. / sq. ft. Natural Kraft backing. Product shall be R-3035 Foil Scrim / Kraft as manufactured by Lamtec® Corporation or approved equal.

2.07 VAPOR RETARDER - VARIABLE PERMEANCE

A. Sheet Retarder: Certainteed MemBrain, The SMART Vapor Retarder. Polyimide film vapor retarder for use with unfaced, vapor permeable glass fiber and mineral wool insulation in wall and ceiling cavities. Material has a permeance of 1 perm or less when tested to ASTM E 86, dry cup method and increases to greater than 10 perms using the wet cup method.
   1. Water Vapor Permeance:
      a. ASTM E 86, dry cup method: 1.0 perms (57ng/Pa*s*m2).
      b. ASTM E 86, wet cup method: 10.0 perms (1144ng/Pa*s*m2).
   2. Fire Hazard Classification: ASTM E 84:
      a. Maximum Flame Spread Index; 20.
      b. Maximum Smoke Developed Index; 55.

2.08 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.

2.09 AT GRADE INSULATION PROTECTION / FLASHING

A. At Grade Insulation Flashing/ Protection: EnergyFlash by EnergyEdge, non-corrosive PVC protection for exposed Rigid insulation materials where below grade insulation extends to meet wall construction above grade. Material is solid core, UV protected exterior grade PVC. Color is Grey. Finish as indicated on the drawings. Material shall comply with ASTM D635, ASTM D696, ASTM E84 and ASTM D1929.
   1. Model: ES217 (13 3/4 inches high with 2 3/16 inch top return and a 3 inch vertical nailing flange)Provide Pre-fabricated Corners and matching fasteners

2. Provide Pre-fabricated Corners and Matching fasteners.
3. Install in accordance with manufacturer's specifications.

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 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.

3.04 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.

3.05 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.

3.06 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. Copings and splice plates.
   2. Drip edges.
   3. Base and Counter flashing.
   4. Liquid Flashing.

1.03 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.04 REFERENCES:

A. ASTM B32 - Standard Specification for Solder Metal; 2020.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

C. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2022.

D. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.
   1. Detail fabrication and installation layouts, details. Distinguish between shop- and field-assembled work.
   2. Include identification of material, thickness, weight, and finish for each item and location in Project.
   3. Include details for forming, including profiles, shapes, seams, and dimensions.
   4. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
   5. Include details of termination points and assemblies.
   6. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
   7. Include details of roof-penetration flashing.
   8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashing as applicable.
   9. Include details of special conditions.
   10. Include details of through wall scuppers including section details, dimensions of scupper openings and height above finished roof surface, edge sealing details, interface and sealing with roof membrane system, counterflashing and exposed exterior fascia conditions.
   11. Include details of connections to adjoining work.

C. Samples for Verification: For each type of exposed finish.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping, scupper, roof edge and flashing required to complete the roofing system. All sheet metal shall be SPRI ES-1 tested and FM approved for this project.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.07 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. For copings and roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

D. Perform work in accordance with SMACNA (ASMM), CDA A4050, and approved manufacturers requirements and standard details, except as otherwise indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.09 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    a. Color fading more than 5 Hunter units when tested according to ASTM 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: Twenty (20) years from date of Substantial Completion.

B. Metal Copings, Gravel Stops, scuppers, roof edges, counterflashing, and other components incorporated or in contact with the Roofing System shall be pre-approved by and made integral to the 30-year Total Roofing System warranty specified in Division 07. Shop drawings and components shall be reviewed and approved by the Roofing manufacturer prior to submittal to the architect for approval. Submit a letter signed by a current representative of the manufacturer on Roofing manufacturer letterhead, attesting to this approval and warranty acceptability. Submit this certification letter as part of the Shop Drawing submittals for this section.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown

unless more stringent requirements are indicated or required by the approved roofing manufacturer responsible for providing the Total System Warranty for the roof system.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. FM Approvals Listing: Manufacture and install copings, roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-120 Identify materials with name of fabricator and design approved by FM Approvals.

E. SPRI Wind Design Standard: Manufacture and install Metal Copings, Gravel Stops, Scuppers, Roof edges, Counterflashing, and other components of roof metal work tested according to SPRI ES-1 and capable of resisting the required design pressure.

F. Recycled Content of Copper-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 40 percent.

G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material

2.02 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   1. Thickness: 0.040 inch, 0.050 inch, or 0.063 inch as indicated on the drawings.
   2. Exposed Coil-Coated Finish:
      a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   3. Color: As selected by the Architect from the manufacturer's full range of color offerings.
   4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.03 UNDERLAYMENT MATERIALS

A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; non-perforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
   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. Grace Construction Products, a unit of W. R. Grace & Co.-Conn; Grace Ice and Water Shield HT.
      b. Henry Company; Blueskin PE200 HT.
   2. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F or higher.
   3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.04 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C920, elastomeric polyurethane silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Liquid Flashing:
   1. Provide two-component polyurethane-based resin liquid flashing that is compatible with roof membrane and all substrate materials.
   2. Use manufacturer's recommended fabric for reinforcing liquid flashing.
   3. Install liquid flashing in accordance with manufacturer's written installation instructions and recommendations.

2.05 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
   1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   2. Obtain field measurements for accurate fit before shop fabrication.
   3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
   4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
   1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams: Fabricate non-moving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

2.06 LOW SLOPE ROOF SHEET METAL FABRICATIONS

A. Drip Edges: Fabricate from the following materials:
   1. Aluminum: 0.050 inch thick.
   2. Finish: Premium fluoropolymer, PVDF, Kynar 500/HYLAR 5000 coating.
      a. Color as selected by the Architect.

B. Two piece Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
   1. Aluminum: 0.050 inch thick.
   2. Finish: Premium fluoropolymer, PVDF, Kynar 500/HYLAR 5000 coating.
      a. Color as selected by the Architect.

C. Flashing Receivers: Fabricate from the following materials:
   1. Aluminum: 0.050 inch thick.
   2. Finish: Premium fluoropolymer, PVDF, Kynar 500/HYLAR 5000 coating.
      a. Color as selected by the Architect.

D. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Aluminum: 0.050 inch thick.
   2. Finish: Premium fluoropolymer, PVDF, Kynar 500/HYLAR 5000 coating.
      a. Color as selected by the Architect.

2.07 MISCELLANEOUS FLASHINGS - COORDINATED SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
   1. Aluminum Sheet: 0.040 inch thick.
   2. Finish: Premium fluoropolymer, PVDF, Kynar 500/HYLAR 5000 coating.
      a. Color as selected by the Architect.

2.08 GENERAL FINISH REQUIREMENTS

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: 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, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

B. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.03 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
   3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
   5. Torch cutting of sheet metal flashing and trim is not permitted.
   6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
   1. Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

E. Seal joints as required for watertight construction.
   1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
   2. Prepare joints and apply sealants to comply with requirements in Section 079200 - {\t\#1000279}.

3.04 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
   1. Fasten gutter spacers to front and back of gutter.
   2. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
   3. Anchor gutter with gutter brackets spaced not more than 30 inches apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
   4. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
   5. Install continuous gutter screens on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints.
   1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches on center.
   2. Connect downspouts to underground drainage system.

3.05 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.06 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04.

3.07 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.08 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.09 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Soldering operations: Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. Upon completion of sheet metal flashing and trim installations, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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. Pre-finished aluminum gutters.
   2. Pre-finished aluminum downspouts.
   3. Pre-finished aluminum collection boxes.
   4. Cast iron downspout boots.
   5. Related Accessories.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 061000 – Rough Carpentry.
   2. Section 076200 – Sheet Metal Flashing and Trim.

C. Refer to the Contract Drawings for the locations and extent of each component of the system.

1.03 STANDARDS

A. All work of this Section shall conform to manufacturer's recommendations and industry standards including:
   1. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association Inc. - "Architectural Sheet Metal Manual" (latest edition).
   2. ASTM A48 "Standard Specification for Gray Iron Castings".

1.04 SUBMITTALS

A. Submit pursuant to Section 013300 - Submittal Procedures.

B. Submit pursuant to Section 016100 - Product Requirements.

C. Product Data: Furnish details or catalog cuts indicating products to be used conforming with these specifications.

D. Shop drawings showing dimensions, materials, adjacent wall construction, jointing methods, fastening methods including locations and spacing, accessories and all other information needed for a complete system.

E. Installation Instructions: Submit manufacturer's written installation instructions.

F. Mock-up:
   1. If requested by the Architect, provide a 8" long full size sample of the gutter in the selected color and finish.

G. Color Samples for Initial Selection Purposes: Submit manufacturer's color samples of materials, consisting of color charts or color samples representing manufacturer's full range of available colors.

H. Selected Color Samples: Provide three (3) physical samples approximately 4" x 4" in the color(s) and finish selected by the Architect.

I. Warranty
   1. Provide manufacturer's standard twenty (20) year finish warranty for all gutter components and accessories.

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.

B. Installing contractor shall be responsible for installing gutters and downspouts in accordance with manufacturer's printed instructions. Follow primary roofing material manufacturer's printed instructions for installation of joining gravel stops or eave trims.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Pursuant to manufacturer's published instructions.

B. Protect against moisture exposure and damage.

C. All products delivered shall be stored in a clean, dry location prior to installation.

D. Stack pre-formed and pre-finished material on level surface to prevent twisting, bending or abrasion, and to provide ventilation. Slope to drain.

E. Prevent contact with materials during storage which may cause discoloration, staining or damage.

F. Products furnished with strippable protective plastic film should have film removed prior to installation. Such film coated products shall not be exposed to sunlight for more than thirty (30) minutes without removing film.

G. Workers shall use diligent care to avoid damage, scars and abrasions to product when handling.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ATAS International, Inc., 6612 Snowdrift Rd., Allentown, PA 18106. Phone: (800) 468-1441.

B. Products of the approved standing seam roofing manufacturer if different from ATAS.

C. Gutters and downspouts in this Section may be produced by a factory authorized fabricator using finished metal from the approved manufacturer.

D. Source limitations: Metal gutter systems, standing seam roof panels (if any), fascia, soffits, scuppers, copings, flashings, and any other metal roof accessories shall be obtained through one source from a single manufacturer for consistent color quality.

E. Cast Iron Downspout Boots: J.R. Hoe Inc., 101 Ironwood Road, Middlesboro, KY 40965. Phone: 800-245-5521 or Architect approved equivalent.

2.02 MATERIALS

A. Aluminum: ASTM B209, 3003 alloy, H14 temper; 0.050 inch thickness or as indicated; mill finish interior, shop pre-coated 70% PVDF finish, color to match Fascia, U.N.O.

2.03 COMPONENTS

A. Gutters: Shall be manufactured in 12’ lengths. See Contract Drawings for gutter sizes and profiles.
   1. Provide welded, mitered inside and outside corners where required on aluminum gutters. Mitered corners to match gutter profile and size.
   2. Aluminum mitered inside and outside corners shall be factory fabricated in one piece units matching gutter profile and size.

B. Downspouts: SMACNA rectangular profile seamless 4” x 6” from building gutters, 2” x 3” at manufactured canopies, unless noted otherwise. Configure with elbow offsets to provide minimal clearance to building structure while providing allowance for concealed connectors.

C. Collector Box:
   1. ATAS Collector Box 12” H x 12” W x 8” D (or 18” H x 18” W x 12” D).
   2. Material: Pre-finished 0.063 aluminum matching gutter system color.
   3. Provide standard overflow slots in front face.
   4. Outlet size to match downspout.

D. Cast Iron Downspout Boot:
   1. Material: ASTM A48 Class 30 Gray Iron.

2. Offset Style.
3. Size: Length: 30", Top Inlet: sized slightly larger than downspout, Bottom Outlet: sized to underground piping.
4. Provide with side cleanout.
5. Provide rubber, flexible adaptor (coupling) from downspout boot to underground piping. Adaptor may need to be a reducing style. Provide with stainless-steel clamps.
6. Provide two (2) 1/2 -13 x 2-3/4" stainless steel hex bolts with flat washers with drive-in SS double expansion shield for each downspout boot.
7. Provide neoprene wall spacers as required to aid in aligning downspout boot with downspout and underground piping. Spacers shall not exceed 1-1/2" in overall thickness without written authorization from the Architect.
8. Finish: Factory applied powder coat finish. Color as selected by Architect from manufacturer's standard colors.

2.04 ACCESSORIES

A. End Caps/Terminations: Install manufacturer’s end caps at all terminations.

B. Anchorage Devices: Concealed type recommended by manufacturer.

C. Gutter Supports: Hidden flanges screwed to fascia and interlocked/fastened to the top front edge of gutter.

D. Downspout Supports: Flat 1-1/4” minimum width concealed straps matching leader profile and color.

E. Downspout Elbows: Fabricate to downspouts profile with factory soldered connections.

F. Fasteners: Made of same material as items being fastened, finish exposed fasteners same as item being fastened.

G. Provide continuous transitions from downspouts to underground piping without gaps.

H. Splash Blocks: Provide precast concrete type where downspouts discharge onto grade or another roof.
   1. Minimum 5,000 psi at 28 days with minimum 5 percent air entrainment.
   2. Size: 30" long x 12" wide x 3" back height unless noted otherwise.
   3. Color: White cement with color as selected by Architect from manufacturer's standard colors.
   4. Provide roof walkway pads trimmed to one inch larger in all directions of splash block where splash block(s) are located on membrane roofs.

I. Primer: Zinc chromate type.

J. Protective Backing Paint: Bituminous.

2.05 FABRICATION

A. Form gutters, collector boxes, downspouts of profiles and sizes indicated in accordance with approved shop drawings.

B. Fabricate with required connection, expansion and splice pieces.

C. Form sections square in required profile, true and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints and at intervals required by the manufacturer.

D. Hem exposed edges of metal.

E. Solder shop formed metal (steel) joints. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal all field joints and intersections with adjacent materials with color matching exterior vertical grade sealant.

F. If steel gutters connect into collector boxes, shop fabricate short gutter section(s) into collector box with welded or other permanent, watertight connection.

G. If aluminum gutters connect into aluminum collector boxes fabricate to provide watertight, slip connection to allow gutter movement. Gutter should extend a minimum of one-inch into collector box or as recommended by manufacturer/fabricator based on adjoining gutter runs.

H. Fabricate gutter and downspout accessories, seal watertight.

2.06 FINISHES

A. Apply bituminous protective backing on surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.01 INSTALLATION

A. Verify that surfaces are ready to receive work.

3.02 INSTALLATION

A. Install gutters, downspouts and accessories in accordance with manufacturer's instructions and approved shop drawings.

B. Slope gutters 1/8" per foot minimum to leader locations.

C. Install collector box(es) where shown on Contract Drawings per manufacturer and SMACNA standards.

D. Seal metal joints other than factory welded joints watertight.

E. Provide leader strap connections at 5'-0" maximum with a minimum of at least two connections per section.

F. Gutter Attachment:
   1. All gutter hangers shall be installed and fastened at 30" o.c. maximum u.n.o.
   2. Gutters less than 6'-0" in length, hanger spacing shall be 16" o.c. maximum.
   3. Gutters located at roof valleys or other high waterflow areas, hanger spacing shall be 16" o.c. maximum.

G. Inside corner gutters shall be equipped with splash guards extending a minimum of 7" in each direction. Splash guards to match gutter color and finish.

H. Install cast iron downspout boots where gutter downspouts are shown to connect to underground piping. Install rubber adaptor (coupling) to underground piping.

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 Contact 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 be keep 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:
   1. Manual Overhead Interior Coiling Doors

1.03 REFERENCES

A. ANSI/DASMA 203 - American National Standards Institute Specifications for non-rated fire rolling doors published by Door & Access Systems Manufacturers Association International.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2022a.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2025a.

E. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

F. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process; 2022.

G. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

I. 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).

J. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 ACTION SUBMITTALS

A. Submit in accordance with Section 013300 - SUBMITTALS

B. Product Data: For each type and size of overhead coiling door and accessory.
   1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
   2. Include rated capacities, operating characteristics, and furnished accessories.
   3. Storage and handling requirements and recommendations.

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
   1. Include plans, elevations, sections, and mounting details.
   2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
   3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
   4. Show locations of controls, locking devices, and other accessories.
   5. Include diagrams for power, signal, and control wiring.

6. Regulatory Requirements and Approvals: Provide shop drawings in compliance with local Authority Having Jurisdiction (AHJ).

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Submit manufacturer's certificate that products meet or exceed specified requirements.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
   1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

B. Manufacturer Qualifications: Company with a minimum of five (5) year experience in producing the specified type of doors.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction

1.09 WARRANTY

A. Provide Rolling Aluminum Service doors with two (2)-year Warranty on defects in materials and workmanship on the door.

PART 2 PRODUCTS

2.01 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE 7.
   1. Component Importance Factor: 1.15.

2.03 DOOR ASSEMBLY

A. Non-insulated Service Door: Overhead coiling door formed with curtain of interlocking aluminum slats.
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Cornell Iron Works, Inc. (Basis of Specification) - Model: ESD10
         24 Elmwood Avenue, Mountain Top, PA 18707. Telephone: (800) 233-8366.
      b. Architect approved equivalent.

B. Operation Cycles: Door components and operators capable of operating for not less than 100,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Non-Insulated Door Curtain Material: No. 5F, 16 gauge (0.050 mm) alumunum.

D. Door Curtain Slats for Cornell: ESD10: Interlocked Flat Slats (1F) with 1 1/2 inches center-to-center height by 1/2 deep.
   1. Gasket Seal. Manufacturer's standard continuous gaskets between slats.
   2. Endlocks: Zinc-plated malleable cast iron endlocks fastened with two zinc-plated steel rivets.

E. Bottom Bar: Manufacturer's standard extruded aluminum.

F. Curtain Jamb Guides: Angle guide assembly shall form a slot to retain curtains in guides. Structural grade, three angle assembly fabricated of Structural Aluminum curtain slats.
   1. Provide Snap-on dual durometer vinyl Guide Weatherseal

G. Brackets: Design to enclose ends of coil and provide support for counterbalance pipe at each end. Fabricate of Stainless Steel plates, with permanently sealed ball bearings. Thickness shall be 1/4 inch. Finish shall match remainder of door. Attach to wall angle of guide assembly with minimum 1/2 inch diameter, Grade 5 bolts.

H. Hood: Match curtain material and finish: Aluminum in manufacturer's standard thickness.
   1. Shape: Square.
   2. Mounting: Face of Wall - Interior.
   3. Hood Baffle: Provide with internal baffle to inhibit air infiltration through the hood cavity.
   4. Header Seal: provide 'Z" shape aluminum retainer with EPDM sweep to inhibit air infiltration between the header and the curtain.
   5. Provide minimum 1/4 inch steel intermediate support brackets as required.
   6. Finish: Black anodized.

I. Head Plate Cover: Finished Cover to conceal Head Plates. Finish to match Hood.

J. Door Finish:
   1. Aluminum anodized black.
   2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.04 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

2.05 HOODS

A. General: Form aluminum hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
   1. Provide Head Plate Cover to match Hood

2.06 LOCKING DEVICES

A. Master keyable cylinder operable from fascia side opening.
   1. Standard Mortise Cylinder. Coordinated with Owner's keying requirements.

B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.07 CURTAIN ACCESSORIES

A. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

2.08 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a

spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless carbon-steel pipe (minimum of 4 1/2 inches diameter structural steel pipe with a wall thickness of 0.120 inches) of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.033 in./ft. of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
   1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic closing device operates.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of Galvanized Steel plate. Finish to match remainder of door.

2.09 STEEL, ALUMINUM AND GALVANIZED-STEEL FINISHES

A. Stainless Steel finish: Aluminum: Black anodized.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install overhead coiling doors complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, and hoods, at the mounting locations indicated for each door.

3.03 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.
   1. Perform installation and startup checks according to manufacturer's written instructions.
   2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.04 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide tight fit around entire perimeter.

3.05 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
   1. Perform maintenance, including emergency callback service, during normal working hours.

2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

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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 commercial door hardware for the following:
   1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Door Closers

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ICC A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC (IBC) - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. State Building Codes, Local Amendments.

D. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
   1. ANSI/BHMA A156.29 Certified Product Standards - A156 Series.
   2. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
   3. UL 294 - Access Control System Units.
   4. UL 305 - Panic Hardware.
   5. UL 437 - Key Locks.

1.03 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
   3. Content: Include the following information:
      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      e. Explanation of abbreviations, symbols, and codes contained in schedule.
      f. Mounting locations for door hardware.

g. Door and frame sizes and materials.
h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

D. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.04 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.06 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.07 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
1. Ten years for mortise locks and latches.
2. Five years for exit hardware.
3. Twenty-five years for manual overhead door closer bodies.
4. Five years for motorized electric latch retraction exit devices.
5. Two years for electromechanical door hardware, unless noted otherwise.

1.08 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
   1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’-0”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’-1” to 4’-0”: 5” standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
   4. Hinge Options: Comply with the following:
      a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
   5. Manufacturers:
      a. Bommer Industries (BO).
      b. Hager Companies (HA).
      c. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
   1. Manufacturers:
      a. Bommer Industries (BO).

b. Ives (IV).
c. Pemko (PE).

2.03 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
a. Door Controls International (DC).
b. Rockwood (RO).
c. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
3. Manufacturers:
a. Hiawatha, Inc. (HI).
b. Rockwood (RO).
c. Trimco (TC).

2.04 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
6. Keyway: Manufacturer’s Standard.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
1. Patented key systems shall not be established with products that have an expired patent. Expired systems shall only be specified and supplied to support existing systems.
2. Manufacturers:
a. Corbin Russwin (RU) - Access 3 AP.
b. Sargent (SA) - Degree DG1.

E. Keying System: Each type of lock and cylinders to be factory keyed.
   1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
   2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
   3. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:
   1. Change Keys per Cylinder: Three (3).
   2. Master Keys (per Master Key Level/Group): Five (5).
   3. Construction Keys (where required): Ten (10).

G. Construction Keying: Provide construction master keyed cylinders.

H. Key Registration List (Bitting List):
   1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
   2. Provide transcript list in writing or electronic file as directed by the Owner.

2.05 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
   1. Manufacturers:
      a. Lund Equipment (LU).
      b. MMF Industries (MM).
      c. Telkee (TK).

2.06 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
   1. Where specified, provide status indicators with highly reflective color and wording for “locked/unlocked” or “vacant/occupied” with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1” x 0.6” with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.
   2. Manufacturers:
      a. Corbin Russwin Hardware (RU) - ML2000 Series.
      b. Sargent Manufacturing (SA) - 8200 Series.
      c. Schlage (SC) - L9000 Series.

B. Multi-Point Locksets: ANSI/BHMA A156.37, Certified Products Directory (CPD) listed vertical rod locking devices designed for openings requiring multiple latching points within one locking mechanism. Rods are retracted by dual mounted outside lever trim controls available in a variety of ANSI/BHMA operational functions. Option for single top latching only eliminates the need for bottom strikes.
   1. Manufacturers:
      a. Corbin Russwin Hardware (RU) - MP9800 Series.
      b. Sargent Manufacturing (SA) - 7000 Series.
      c. Schlage (SC) - LM9200 Series.

2.07 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.
   1. Manufacturers:
      a. Corbin Russwin Hardware (RU) - DL4000 Series.
      b. Sargent Manufacturing (SA) - 4870 Series.
      c. Schlage (SC) - L460 Series.

2.08 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
   4. Dustproof Strikes: BHMA A156.16.

2.09 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
   1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
   2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
   3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
   4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
   5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
      a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
      b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
   6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
8. Dummy Push Bar: Non-functioning push bar matching functional push bar.
9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.
c. dormakaba Precision (PR) - Apex 2000 Series.

2.10 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL 10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ICC A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Manufacturers:
a. Norton Rixson (NO) - 7500 Series.
b. Sargent Manufacturing (SA) - 351 Series.
c. Yale Commercial(YA) - 4400 Series.

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood (RO).
   c. Trimco (TC).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
   1. National Guard Products (NG).
   2. Pemko (PE).
   3. Reese Enterprises, Inc. (RE).

2.13 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify Architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
   3. Where indicated to comply with accessibility requirements, comply with ICC A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.04 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
   1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.05 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.

3.06 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 HARDWARE SCHEDULE

A. Closer replacement on selected existing doors. See Contract Drawings for identification of doors to receive new closers.
   1. Remove existing closure and dispose of properly.
   2. Patch any holes with wood or metal filler, sand smooth. Stian or paint area to match door.
   3. Provide new closer of style, size, and configuration appropriate for door. Verify in filed door size and swing. Closer to be of a quality as specified in paragraph 2.10.

END OF SECTION 087100

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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 glazing for the following products, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Vision Lites.
   2. Exterior Doors, Transoms and Side Lites.
   3. Interior Doors, Transoms and Side Lites.
   4. Aluminum Framed Window System.
   5. Aluminum Framed Entrances and Storefronts.
   6. Insulated Glazing Infill Panels.
   7. Casework Cabinet Door Glazing.
   8. Escape Labeling for Glazed Windows.

1.03 REFERENCES

A. Referenced Standards: These standards (latest edition or edition in force by AHJ) form part of this specification only to the extent they are referenced as a specification requirement. Refer to the below referenced publications (latest edition) for glazing terms not otherwise defined in this section.

B. AAMA A804.1 "Voluntary Specification for Ductile Back-Bedding Compound" (mandatory).

C. AAMA A807.1 "Voluntary Specification for Oil-Extended Cured Rubber Back-Bedding Glazing Tapes" (mandatory).

D. AAMA 2605 "Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings On Aluminum Extrusions and Panels".

E. ANSI Z97.1 “American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test”.

F. ASCE/SEI 7-16 "Minimum Design Loads and Associated Criteria for Buildings and Other Structures".

G. ASTM C162 "Standard Terminology of Glass and Glass Products".

H. ASTM C509 "Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material".

I. ASTM C864 "Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers".

J. ASTM C920 "Standard Specification for Elastomeric Joint Sealants".

K. ASTM C1036 "Standard Specification for Flat Glass".

L. ASTM C1048 "Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass".

M. ASTM C1172 "Standard Specification for Laminated Architectural Flat Glass".

N. ASTM D523 "Standard Test Method for Specular Gloss".

O. ASTM E119 "Standard Test Methods for Fire Tests of Building Construction and Materials".

P. ASTM E1300 “Standard Practice for Determining Load Resistance of Glass in Buildings”.

Q. ASTM E2190 "Standard Specification for Insulating Glass Unit Performance and Evaluation".

R. CPSC "16CFR1201, Safety Standard for Architectural Glazing Materials".

S. FGIA (Fenestration and Glazing Industry Alliance) IGMA TM-300 "North American Glazing Guidelines for Sealed Insulated Glass Units for Commercial and Residential Use".

T. AAMA Recommendations and Guidelines.

U. NFRC (National Fenestration Rating Council) 100 "Procedure for Determining Fenestration Product U-Factors"

V. NFRC 200 "Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence".

W. NFRC 300 "Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems".

1.04 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thickness: Indicated by thickness designations in inches (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.

E. Solar Heat Gain Coefficient (SHGC): The amount of solar radiation that enters a building as heat. The lower the number, the better the glazing is at preventing solar gain.

F. Fading Transmission: The UV Transmittance is determined as an average for wavelengths 300 -380 nm. ISO is the weighted average for wavelengths 300 – 700 nm (based on CIE 89/3). This region includes all of the ultraviolet energy and part of the visible spectrum and will give the best representation of relative fading rates. The lower the number, the better the glass is for reducing fading potential of carpets and interior furnishings.

G. U-Factor: This represents the heat flow rate through a window expressed in IP (BTU/hr·ft²·°F) and SI (W/m2K), using winter night weather conditions of 0°F outside and 70°F inside. The smaller the number, the better the window system is at reducing heat loss.

H. Glazing Gasket: A pre-formed elastomeric or plastic material applied between the face of the glass or panel and the framing to provide resilient support between the glass or panel and the framing, and to prevent the passage of air and water.

1.05 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 E1300 by a qualified professional engineer licensed in the State of the project, using the following design criteria:
   1. Design Wind Pressure: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Contract Drawings.
      a. Wind Design Data: As indicated on Contract Drawings.

b. Basic Wind Speed : 120 mph.
c. Risk Category: III.
d. Seismic Zone: As indicated on Contract Drawings.

2. Design Snow Loads: As indicated on Contract Drawings.
3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or one (1) inch, whichever is less.
4. 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.

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 degree F, ambient; 180 degree F, material surfaces.
2. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

1.06 SUBMITTALS

A. Pursuant to Section 013300 - Submittal Procedures.

B. Pursuant to Section 016100 - Basic Product Requirements

C. Product data: Description of each type of glass, glazing product, and accessory product.

D. Glazing Schedule: List glass types, thicknesses, tints (if any) for each opening and location. Use same designations as indicated on Contract Drawings.
1. Include glazing in-fill panels and spandrel panels if applicable.

E. Shop Drawings:
1. Submit shop drawings indicating project layout and elevations, fastening and anchoring methods, dimensions of individual components, detail of joints, sealants and gaskets, and accessories.

F. Samples:
1. Provide 12” x 12” samples of all tinted glass. Other glass only if requested by Architect.
2. Provide 6" x 6" samples of glazing in-fills panels in the finish and thickness specified.

G. Closeout Documents:
1. Product Certificates:
a. Statement that fire rated glass provided for fire rated doors meets labeling or certification requirements of public authorities.
b. Statement that the extent of tempered glass meets requirements of public authorities.
c. Installing Contractor shall submit on company letterhead, certification that insulated glass installed meets all the specified performance values required in this specification. The certification shall list all the performance values. This certification must be signed by an officer of the company and notarized.
2. Maintenance data for glass and other glazing materials to be included in Operating and Maintenance Manual specified in Division 01.
3. Executed Warranties as specified below.

1.07 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.

B. Qualifications of Installer: Provide glazing work by an installer who has installed the specified products for at least 2 years.

C. Single-Source Responsibility for Glass and Glazing Accessories: Obtain glass and accessories from one source for each product indicated.

D. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:
   1. Insulating Glass Certification Council (IGCC).
   2. Associated Laboratories, Inc. (ALI).
   3. National Certified Testing Laboratories (NCTL).

E. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.
   1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.

F. Fire-Protection Rated Glazing Labeling: Permanently mark fire-protection rated glazing with certification label of testing agency acceptable to authorities having jurisdiction. Label shall indicate the following:
   1. Manufacturer.
   2. Test Standard.
   3. Whether glazing is for use in fire doors.
   4. Hose-stream test.
   5. Temperature rise rating.
   6. Fire -resistance rating in minutes.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Pursuant to manufacturers published instructions.

B. Protect against moisture exposure and damage.

C. Package, handle, and store glass so that water does not touch or condense on glass surfaces.

D. Protect glass edges against chipping and other damage. Protect coated glass surfaces from abrasion and scratching.

E. Store glass and glazing products in controlled environment, out of sunlight, so that temperature does not go above 80º F. Bring glazing materials to at least 40º F, or higher temperature if recommended by producer, before installing.

F. Furnish labels identifying each type of glass. Keep labels in place until glass is installed.

1.09 WARRANTY

A. General: Warranties specified in this Article 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 requirements of the Contract Documents.

B. Manufacturer’s Warranty on Insulating Glass: Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that deteriorate as defined in “Definitions” article f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer’s published instructions.
   1. Warranty Period: Manufacturer’s standard, but not less than ten (10) years after date of Substantial Completion.

C. Manufacturer’s Warranty on Coated Glass Products: Submit written warranty signed by manufacturer of coated glass agreeing to furnish replacements for those coated glass units that deteriorate 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. Warranty covers only

deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.

1. Warranty Period: Manufacturer's standard, but not less than ten (10) years after date of Substantial Completion.

D. Manufacturer's Warranty on Laminated Glass: Submit written warranty signed by manufacturer of laminated glass agreeing to furnish replacements for those laminated glass units that deteriorate within specified warranty period. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.

1. Warranty Period: Manufacturer's standard, but not less than ten (10) years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 GLAZING PERFORMANCE REQUIREMENTS

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. Where fully tempered glass is indicated or required, provide Kind FT heat-treated float glass.

C. 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 7.8 computer program, expressed in 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 7.8 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 1; Quality-Q3; Class 1 (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. Interior Casework Doors Glazing

1. 3/16" Tempered clear flat glass.
2. Color: Clear.

2.03 LAMINATED GLASS

A. Laminated Glass: ASTM C1172 and complying with testing requirements in 16 CFR 1201 for Category 11 materials, and with other requirements specified. Use materials that have proven

record of no tendency to bubble, discolor, or loose 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. 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. Provide a triple silver coating.
2. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
3. Spacer: Manufacturer's standard aluminum spacer material and construction.
4. Desiccant: Molecular sieve or silica gel, or blend of both.
5. Interspace Content: Argon.
6. Performance Requirements (1" Glass Units):
   a. **Visible Light Transmittance: 65%.**
   b. **External Reflectance: 11%.**
   c. **Internal Reflectance: 12%.**
   d. **Solar Height Gain Coefficient (SHGC): 0.27.**
   e. **Center of Glass U-Factor: 0.24 IP (Argon Fill).**
   f. **Fade Transmission UV: 5%.**
   g. **Fade Transmission ISO: 43%.**
7. Product: Cardinal LoE³-366 or Architect approved equivalent meeting or exceeding all of the above performance requirements.

2.05 FIRE-PROTECTION-RATED GLAZING

A. Multi-laminate Fire-Rated (45 to 120 minutes), Impact Safety-Rated Fireglass multi-laminate glass with clear intumescent layers, interior and exterior use, meets CPSC 16 CFR 1201 (Cat. I and II) and ANZI Z97.1. Provide protection against radiant and conductive heat transfer per ASTM E119 and UL 263, withstands thermal shock. Five (5) year limited warranty.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering fire rated glass products that may be incorporated in the Work include, but are not limited to the following:

1. SAFTI FIRST, 100 N. Hill Dr., Suite 12, Brisbane, CA 94005. Phone: 888-653-3333 (Basis of Specification).
2. Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 Phone: 800-426-0279.
3. Pilkington North America, 811 Madison Ave., Toledo, OH 43604 Phone: (800) 221 0444.
4. Architect Approved Equivalent.

C. Material:

1. SuperClear 45-HS-LI 45 minute fire and safety rated glazing by SAFTIFIRST.
2. GP Firelite Plus® by Technical Glass Products.
3. Pilkington Pyrostop®: 45-200; 45 minute, 3/4" thick, STC 40; U-Value 0.86

D. Design Requirements:

1. Thickness: ¾” standard or manufacturer's standard thickness required to meet the rating.

2. Sound Transmission Rating: Must meet 38 STC/35 OITC in standard hollow metal frames. Glass and frame must be tested as an assembly. Glass only STC/OITC values are not acceptable.
3. Appearance: clear, wireless and tint-free.
4. Visual Light Transmission: Must meet minimum 85% VLT for low-iron.
5. Fire Rating: 45 minutes with hose stream.
6. Impact Safety Resistance: Must meet CPSC 16 CFR 1201 Category I and II, ANSI Z91.1 Class A and B and CAN/CGSB 12.1 Class A and B.

E. Manufacturer's Fire Rated Glazing Material:
1. Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory, fire rating period and safety glazing standards.
2. Glazing material installed in Hazardous Locations, subject to human impact, shall be certified and permanently labeled as meeting applicable requirements referenced in NFPA 80:
a. CPSC 16 CFR 1201, Cat. I or II.

2.06 GLAZING INFILL PANELS

A. Manufacturer:
1. Citadel Architectural Products, Inc.; 3131-A North Franklin Road, Indianapolis, IN 46226. Phone: 800-446-8828.
2. Architect Approved Equivalent.

B. Panel:
1. GlazeGuard 1000 WR Plus
a. Composition:
1) Face: 0.010" (min) prefinished textured aluminum.
2) Stabilizer: 3 mm high density polypropylene.
3) Core: 11/16" polyisocyanurate (ISO) foam.
4) Stabilizer: 3 mm high density polypropylene.
5) Back: 0.010" (min) prefinished textured aluminum.
b. Thickness: 1" (nominal).
c. Performance:
1) Surface Burning Characteristics: Panel shall have a Flame Spread Matrix Index less than 25, and a Smoke Developed Index less than 450. Testing shall be in accordance with ASTM E84.
d. Finish:
1) Anodized: To match storefront or curtain wall finish, U.N.O.
e. Installation Method: On setting blocks and sealed with gaskets matching glazing gaskets.

2.07 DECALS

A. All transparent doors and fixed adjacent transparent glass sidelights shall be marked in two areas on the glass surface thereof. One such area shall be located at least 30 inches, but not more than 36 inches and the other at least 60 inches, but not more than 66 inches above the finished floor below the door or sidelight.
1. Decal shall be of such design as to be readily discernible to any person approaching the doors and sidelights from any direction.

B. Description: Self-adhering acrylic or polyester sheet material in one-color design. Provide decals on each side of glazing, aligned back to back.
1. Size: Circular, 5 inches in diameter.
2. Color: Red
3. Refer to the Code for alternative marking methods.

C. Emergency Escape Window Labeling:
   1. Provide vinyl window decal 5"x3" minimum dimension.
   2. Colors: Red and White.
   3. May be required on new and existing windows.

2.08 GLAZING MATERIALS

A. Description: Provide glazing materials that are compatible with one another and with materials of glazing channel as well as with any sealants or interlayers in the glass units.
   1. Product quality assurance: Confirm compatibility of all products used or encountered in executing the work of this Section. Test as necessary to assure short and long term performance of frames, glazing materials, and glass without loss of seal, gassing, staining, discoloration, softening, deterioration, racking, breaking, or leaking.
   2. Color: Provide glazing materials, which match color of glazing channel. If color match is not available, submit color samples to Architect for color selection.

2.09 GLAZING TAPES

A. Description: 100% solids, extruded, non-staining butyl-isobutylene tape. Provide hard spacer rod for use in lights over 80 united in.

B. Standards:
   1. AAMA A804.1, for normal use.
   2. AAMA A807.1, for use where much thermal movement is anticipated.

2.10 GLAZING GASKETS

A. Description: Chloroprene (neoprene), EPDM, or Silicone compression gaskets in a soft and a dense formulation for the two sides of the glass. Select soft gasket to compress 25 to 40% when glass and dense gasket are in place.
   1. Where small lites (as in doors) can be glazed with a continuous preformed elastomeric glazing extrusion, use a gasket of the dense formulation, compressed to watertightness outside and inside, with either a bent joint or a tightly compressed cut joint at corners.

B. 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.

C. 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.

2.11 GLAZING ACCESSORIES

A. Setting blocks, edge blocks, spacers, and gaskets: Chloroprene (neoprene), EPDM, or silicone: ASTM C864.
   1. Hardness of setting blocks: Sufficient to compress no more than 20% under weight of glass.

B. Cleaners, solvents: As recommended by glazing material producer for each type of glass, glazing material, and substrate.

PART 3 EXECUTION

3.01 PREPARATION

A. Examine frames and other construction, which supports or underlies glazing work. Where frames are out of square, out of plane, subject to excessive deflection, or where substrates contain bond breaking substances, moisture, unsound material, or where there are other conditions unsuitable for proper installation or performance of the glazing work, do not start glazing work until defective earlier construction has been completed or corrected.

B. For exterior glazing, do not start glazing until each lite is provided with 2 or more weepholes, not more than 3 ft o.c.

C. Remove dust and other bond breaking substances from surfaces to be glazed. Do not glaze wet, damp, or uncured surfaces.

3.02 INSTALLATION

A. Installation includes such work as surface preparation, priming, cleaning, protecting, and repairing or replacing defective and damaged work.

B. Provide safety glass in lites where required by 16CFR1201 and public authorities, and at other locations as specified herein.

C. Install glazing according to FGMA Glazing Manual.

D. Orient glass so that wave and other distortions run horizontally.

E. Install glass and glazing materials only when the temperatures of air, materials, and substrate are above 40 F. If air temperature is below 40 F, protect them and bring glazing materials to temperature recommended by producer.

F. Install fire-protection-rated glass in fire rated door vision lites and fire rated windows using sealant approved by the fire rating agency for use with the tested assembly. In existing frames, modify or replace glazing stops to:
   1. Accommodate new glass thickness.
   2. Glazing stop heights must be 3/4" in height.

G. At transparent glass doors, fixed adjacent glass sidelights, and other glazed openings that extend to within 18 inches of the floor, provide decals in locations outlined in Part 2.

H. Install glazing infill panels in accordance with manufacturer's written instructions.

3.03 PROTECTION

A. Temporarily during construction, identify glazed areas by hanging narrow streamers from walls and mullions. Do not mark glass nor affix decals to glass except for permanent decals as required by Code.

B. Clean installed glass and infill panels (if applicable) frequently during construction. Do not place other materials in contact with glass nor in such a way as to create a heat trap.

C. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

D. Wash glass on both faces in each area of project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.
   1. Install permanent decals required by Code after final cleaning of glazing.

3.04 GLAZING SCHEDULE EXTERIOR

A. Aluminum Entrance Doors
   1. 1” LoĒ³-366 insulated glass.
   2. Temper: all lites.

3. Color:
    a. Interior Glazing: Clear.
    b. Exterior Glazing: Clear.
4. Type: Plain.
5. Glazing method: Gasket.

B. Exterior Transoms and/or Sidelites
1. 1” LoĒ³-366 insulated glass.
2. Temper: All lites within 18” of doors or floor.
3. Color:
    a. Interior Glazing: Clear.
    b. Exterior Glazing: Clear.
4. Type: Plain.
5. Glazing method: Gasket.

C. Aluminum Window Systems
1. 1” LoĒ³-366 insulated glass.
2. 1" Insulated Glazing Infill Panels (in locations shown on Contract Drawings).
3. Temper: all lites within 18” of doors or floor.
4. Color:
    a. Interior Glazing: Clear.
    b. Exterior Glazing: Clear.
5. Type: Plain.
6. Glazing method: Gasket.

D. Aluminum Curtain Walls or Storefront Walls
1. 1” LoĒ³-366 insulated glass.
2. 1" Insulated Glazing Infill Panels (in locations shown on Contract Drawings).
3. Temper: all lites within 18” of doors or floor.
4. Color:
    a. Interior Glazing: Clear.
    b. Exterior Glazing: Clear.
5. Type: Plain.
6. Glazing method: Gasket.

E. Hollow Metal and/or Fiberglass Entrance Doors
1. 1" LoĒ³-366 insulated glass or fire protection-rated glass if exterior door is fire rated.
2. Temper: all lites.
3. Color:
    a. Interior Glazing: Clear.
    b. Exterior Glazing: Clear.
4. Type: Plain.
5. Glazing method: Tape or gasket for lites smaller than 5 sq. ft.

3.05 GLAZING SCHEDULE INTERIOR

A. Interior Transoms and/or Sidelites
1. Thickness: ¼”.
2. Temper: All lites within 18” of doors or floor.
3. Color: Clear.
4. Type: Plain.
5. Glazing method: Gasket.

B. Fixed Steel Windows and Vision Panels:
1. Thickness: ¼”.

2. Color: Clear.
3. Type:
    a. Fire Rated Openings: Fire-Protection-Rated Glass.
    b. Temper: All lites within 18” of doors or floor.
    c. Plain: All other glazing.
4. Glazing method: Tape or gasket perimeters.

C. Fire Rated Doors
1. Thickness: 3/4”.
2. Color: Clear.
3. Type: Fire-Protection-Rated Glass.
4. Glazing Method: Fire rated gasket.

D. Other Interior Doors
1. Thickness: ¼”.
2. Color: Clear.
3. Type: Temper all lites.
4. Glazing Method: Tape or gasket perimeters.

E. Cabinet Doors
1. Thickness: 3/16".
2. Color: Clear.
3. Type: Tempered.

END OF SECTION

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PART 1 GENERAL

1.01 SECTION INCLUDES

A. Safety and security window film.

B. Anti-graffiti window film.

C. Film attachment systems.

1.02 REFERENCES

A. ASHRAE - American Society for Heating, Refrigeration, and Air Conditioning Engineers; Handbook of Fundamentals.

B. ASTM International (ASTM):
1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
2. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
3. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
4. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
5. ASTM D1044 - Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test).
6. ASTM D2240 - Standard Method for Rubber Property - Durometer Hardness.
7. ASTM D2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
8. ASTM D5895 - Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders.
9. ASTM D4830 - Standard Test Methods for Characterizing Thermoplastic Fabrics Used in Roofing and Waterproofing.
10. ASTM E84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
11. ASTM E903 - Standard Methods of Test for Solar Absorbence, Reflectance and Transmittance of Materials Using Integrating Spheres.
12. 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.
13. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
14. ASTM F1642 - Standard Method of Test for Glazing and Glazing Systems Subject to Airblast Loadings.
15. ASTM F2912 - Standard Specification for Glazing and Glazing Systems Subject to Airblast Loadings.

C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

D. Consumer Products Safety Commission 16 CFR, Part 1201 - Safety Standard for Architectural Glazing Materials.

E. GSA-TS01-2003 -- Standard Test for Glazing and Glazing Systems Subject to Airblast Loadings.

F. ISO 16933, International Standard for Glass in Building: Explosion-resistant security glazing - Test and classification for arena air-blast testing.

G. Underwriters Laboratories Inc. (UL): UL 972 - Burglary Resisting Glazing Material.

1.03 PERFORMANCE REQUIREMENTS

A. Safety Glazing Impact Performance:
   1. 400 ft-lbs impact resistance, meeting ANSI Z97.1 (Class A, Unlimited) and 16 CFR 1201 (Category 2) impact requirements with film applied on 1/4 inch annealed glass.
   2. Impact Resistance after Aging: 400 ft-lbs, meeting ANSI Z97.1 (Class A, Unlimited) and 16 CFR 1201 (Category 2) impact requirements with film applied on 1/8 inch annealed glass.
   3. 400 ft-lbs impact resistance, meeting 16 CFR 1201 (Category 2) impact requirements with film applied on 1/4 inch annealed glass.
   4. 150 ft-lbs impact resistance, meeting ANSI Z97.1 (Class B, Unlimited) and 16 CFR 1201 (Category 1) impact requirements with film applied on 1/4 inch annealed glass
   5. 400 ft-lbs impact resistance, meeting ANSI Z97.1 (Class A, Unlimited) or 16 CFR 1201 (Category 2) impact requirements with film applied on 1/4 inch annealed glass
   6. 150 ft-lbs impact resistance, meeting ANSI Z97.1 (Class B, Unlimited) and 16 CFR 1201 (Category 1) impact requirements with film applied on 1/4 inch annealed glass
   7. 400 ft-lbs impact resistance, meeting ANSI Z97.1 (Class A, Unlimited) and 16 CFR 1201 (Category 2) impact requirements with film is applied on 1/4 inch annealed glass

B. Impact Resistance and Pressure Cycling:
   1. ASTM E1996 / ASTM E1886: Small Missile "A", +/- 80 psf Design Pressure.
   2. ASTM E1996 / ASTM E1886: Large Missile "C", +/- 75 psf Design Pressure
   3. ASTM E1996 / ASTM E1886: Small Missile "A", +/- 70 psf Design Pressure
   4. ASTM E1996 / ASTM E1886: Small Missile "A", +/- 60 psf Design Pressure
   5. ASTM E1996 / ASTM E1886: Large Missile "C", +/- 60 psf Design Pressure

C. Tear Resistance:
   1. Minimum Graves Area Tear Strength of 1,000 lbs% as measured on coated film product, without liner, per ASTM D1004.
   2. Minimum Graves Area Tear Strength of 1,200 lbs% as measured on coated film product, without liner, per ASTM D1004.
   3. Minimum Graves Area Tear Strength of 1,100 lbs% as measured on coated film product, without liner, per ASTM D1004.

D. Adhesion to Glass:
   1. Minimum 8 lbs/in peel strength per ASTM D3330 (Method A).
   2. Minimum 6 lbs/in peel strength per ASTM D3330 (Method A).
   3. Nominal 4 lbs/in peel strength per ASTM D3330 (Method A).
   4. Minimum 3 lbs/in peel strength per ASTM D3330 (Method A).
   5. Minimum 2 lbs/in peel strength per ASTM D3330 (Method A).

E. Flammability: Surface burning characteristics when tested in accordance ASTM E 84, demonstrating film applied to glass rated Class A for Interior Use:
   1. Flame Spread Index: no greater than 25.
   2. Smoke Developed Index: no greater than 55.

F. Abrasion Resistance:
   1. Film shall have a surface coating that is resistant to abrasion such that less than 3 percent increase of transmitted light haze will result when tested in accordance to ASTM D 1044 using 100 cycles, 500 grams weight, and the CS10F Calibrase Wheel.
   2. Film shall have a surface coating that is resistant to abrasion such that less than 3 percent increase of transmitted light haze will result when tested in accordance to ASTM D 1044 using 100 cycles, 500 grams weight, and the CS10F Calibrase Wheel.
   3. Film shall have a surface coating that is resistant to abrasion such that less than 5 percent increase of transmitted light haze will result when tested in accordance to ASTM D 1044 using 100 cycles, 500 grams weight, and the CS10F Calibrase Wheel.

4. Film shall have a surface coating that is resistant to abrasion such that a nominal 5 percent increase of transmitted light haze will result when tested in accordance to ASTM D 1044 using 100 cycles, 500 grams weight, and the CS10F Calibrase Wheel.
5. Film shall have a surface coating that is resistant to abrasion such that a nominal 3 percent increase of transmitted light haze will result when tested in accordance to ASTM D 1044 using 100 cycles, 500 grams weight, and the CS10F Calibrase Wheel.
6. Film shall have a surface coating that is resistant to abrasion such that less than 2 percent increase of transmitted light haze will result when tested in accordance to ASTM D 1044 using 100 cycles, 500 grams weight, and the CS10F Calibrase Wheel.

G. UV Light Rejection:
1. Minimum of 99.9% UV light rejection (300 - 380 nm), per ASTM E903, as determined with film applied on 1/4 inch clear glass.

1.04 SUBMITTALS

A. Submit under provisions of Section 013300 - Administrative Requirements.

B. Product Data: Manufacturer's current technical literature on each product to be used, including:
1. Manufacturer's Data Sheets.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Installation methods.

C. 3rd Party Test Report Submittal Requirements. Submit the following 3rd Party test reports indicating compliance with the test values listed in this section.
1. Flammability Testing, ASTM E84.
2. Film Properties Testing, ASTM D882.
3. Abrasion Resistance Testing, ASTM D1044.
4. Peel Strength Testing, ASTM D3330.
5. Tear Resistance Testing, ASTM D1004.
6. Puncture Strength Testing, ASTM D4830.
7. Safety Glazing Impact Testing, ANSI Z97.1 and/or 16 CFR 1201.
8. Burglary Resistance Glazing, UL 972
9. Safety Glazing Impact Testing, ANSI Z97.1 and 16 CFR 1201.
10. Impact Resistance and Pressure Cycling, ASTM E1886 and ASTM E1996.
11. Blast Hazard Mitigation Testing, ASTM F1642 / F2912 and/or GSA-TS01-2003.

D. Other Product Submittals:
1. Manufacturer's summary of 3rd Party Blast Hazard Mitigation Testing, ASTM F1642 / F2912 and/or GSA-TS01-2003
2. 3rd Party test reports from Forced Entry Resistance evaluations.

E. Verification Samples: For each film specified, two samples representing actual film color and pattern.

F. Performance Submittals: Provide laboratory data of emissivity and calculated window U-Factors for various outdoor temperatures based upon established calculation procedure defined by the ASHRAE Handbook of Fundamentals, Chapter 29, or Lawrence Berkeley Laboratory Window 5.2 Computer Program.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.
1. Provide documentation that the adhesive used on the specified film is a Pressure Sensitive Adhesive (PSA).

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
   1. Provide documentation that the installer is authorized by the Manufacturer to perform Work specified in this section.
   2. Provide a commercial building reference list of 5 properties where the installer has applied window film. This list will include the following information:
      a. Name of building.
      b. The name and telephone number of a management contact.
      c. Type of glass.
      d. Type of film and/or film attachment system.
      e. Amount of film and/or film attachment system installed.
      f. Date of completion.
   3. Provide a Glass Stress Analysis of the existing glass and proposed glass/film combination as recommended by the film manufacturer.
   4. Provide an EFilm application analysis to determine available energy cost reduction and savings.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Follow Manufacturer's instructions for storage and handling.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store and dispose of any hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.08 WARRANTY

A. At project closeout, provide to Owner's Representative an executed current copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

B. In order to validate warranty, installation must be performed by an Authorized 3M dealer. Verification of Authorized 3M dealer can be confirmed by submission of active 3M dealer code number.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: 3M Commercial Solutions, which is located at: 3M Center Bldg. 220-12-E-04; St. Paul, MN 55144-1000; Toll Free Tel: 888-650-3497; Tel: 651-737-1081; Fax: 651 737 8241; Email: request info (tdjohnson3@mmm.com).|
   1. Area authorized 3M Dealer: Layr: Tel: 888-888-8000; Email: info@layr.com; Web: www.layr.com

B. Requests for substitutions will be considered in accordance with provisions of Section 012500 - WOOD I-JOISTS.

2.02 CLEAR MICROLAYERED SAFETY AND SECURITY WINDOW FILM

A. 3M Scotchshield Ultra S600 Safety and Security Window Film. Optically clear microlayered polyester film, nominally 6 mils (0.006 inch) thick, with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive on the other. The film is clear and does not contain dyed polyester. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. The film is microlayered with both plastic and ductile polyester layers for tear resistance.
   1. Physical / Mechanical Performance Properties (nominal):
      a. Film Color: Clear.
      b. Film Thickness (excluding coatings or adhesive liner): Nominal 6 mils
      c. Tensile Strength (ASTM D882):
         1) Base Film: 32,000 psi (MD) / 32,000 psi (TD).
         2) Coated Film: 32,000 psi (MD) / 32,000 psi (TD).
      d. Break Strength (ASTM D882):
         1) Base Film: 190 lb/in (MD) / 190 lb/in (TD).
         2) Coated Film: 210 lb/in (MD) / 210 lb/in (TD).
      e. Percent Elongation at Break (ASTM D882):
         1) Base Film: 110 % (MD) / 100 % (TD).
         2) Coated Film: 136 % (MD) / 115 % (TD).
      f. Yield Strength:
         1) Base Film: 12,000 psi (MD).
         2) Coated Film: 15,000 psi (MD).
      g. Percent Elongation at Yield (ASTM D882):
         1) Base Film: 7% (MD).
         2) Coated Film: 9% (MD).
      h. Graves Tear Resistance (ASTM D1004):
         1) Maximum Force (lbs):
            (a) Base Film: 28 (MD) / 28 (TD).
            (b) Coated Film: 28 (MD) / 28 (TD).
         2) Maximum Extension (in):
            (a) Base Film: 0.45 (MD) / 0.65 (TD).
            (b) Coated Film: 0.55 (MD) / 0.55 (TD).
         3) Graves Area Tear Resistance (lbs%):
            (a) Base Film: 900 (MD) / 1,200 (TD).
            (b) Coated Film: 900 (MD) / 1,100 (TD).
      i. Puncture Propagation Tear Resistance (ASTM D2582):
         1) Coated Film: 6 lbf (MD) / 7 lbf (TD).
      j. Puncture Strength (ASTM D4830):
         1) Coated Film: 140 lbf.
   2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
   3. Variation in Total Transmission across the width: Less than 2 percent over the average at any portion along the length.
   4. Identification: Labeled as to Manufacturer as listed in this Section.
   5. Solar Performance Properties: Film applied to 1/4 inch (6 mm) thick clear glass.
      a. Visible Light Transmission (ASTM E 903): 87 percent.
      b. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
   6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.

a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
b. Safety Rating (ANSI Z97.1): Class A, Unlimited Size.

7. Impact Resistance and Pressure Cycling: Film shall pass impact of Small Missile "A" and withstand subsequent pressure cycling (per ASTM E 1996 and ASTM E1886E 1886) at +/ 80 psf Design Pressure with use of 3M Impact Protection Adhesive. Film applied to 3/16 inch (4.8 mm) tempered glass.
8. Blast Hazard Mitigation:
9. Independent testing with results from high explosive arena blast or shock tube testing:
    a. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 7 psi and 44 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass and 3M Impact Protection Profile Attachment system.
    b. GSA Rating of "2"/ ASTM F1642 "Minimal Hazard" with blast pressure of 7 psi and 42 psi*msec blast impulse, on 1/4 inch (6 mm) tempered single pane glass and 3M Impact Protection Profile Attachment system
    c. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 7 psi and 42 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass and 3M Impact Protection Adhesive Attachment system
    d. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 7 psi and 42 psi*msec blast impulse, on 1/4 inch (6 mm) tempered single pane glass and 3M Impact Protection Adhesive Attachment system
    e. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 8 psi and 60 psi*msec blast impulse, on 1 inch (25.4 mm) annealed double pane glass and 3M Impact Protection Profile Attachment system
    f. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 8 psi and 60 psi*msec blast impulse, on 1 inch (25.4 mm) annealed double pane glass and 3M Impact Protection Adhesive Attachment system
    g. GSA Rating of "3B" / ASTM F1642 "Very Low Hazard" with blast pressure of 4 psi and 28 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass, daylight applied film (no attachment)
    h. GSA Rating of "3B" / ASTM F1642 "Low Hazard" with blast pressure of 7 psi and 43 psi*msec blast impulse, on 1/4 inch (6 mm) tempered single pane glass, daylight applied film (no attachment)
    i. GSA Rating of "3B" / ASTM F1642 "Low Hazard" with blast pressure of 7 psi and 42 psi*msec blast impulse, on 1 inch (25.4 mm) annealed double pane glass, daylight applied film (no attachment)
    j. GSA Rating of "3B" / ASTM F1642 "Low Hazard" with blast pressure of 12 psi and 70 psi*msec blast impulse, on 1 inch (25.4 mm) tempered double pane glass, daylight applied film (no attachment)
10. Forced Entry Resistance: Product shall have been evaluated for time to resist complete body passage by a qualified 3rd Party test lab.

B. 3M Scotchshield Ultra S800 Safety and Security Window Film. Optically clear microlayered polyester film, nominally 8 mils (0.008 inch) thick, with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive on the other. The film is clear and does not contain dyed polyester. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. The film is microlayered with both plastic and ductile polyester layers for tear resistance.
    1. Physical / Mechanical Performance Properties (nominal):
        a. Film Color: Clear.
        b. Film Thickness (excluding coatings or adhesive liner): Nominal 8 mils
        c. Tensile Strength (ASTM D882):
            1) Base Film: 32,000 psi (MD) / 32,000 psi (TD).
            2) Coated Film: 32,000 psi (MD) / 32,000 psi (TD).

d. Break Strength (ASTM D882):
   1) Base Film: 250 lb/in (MD) / 250 lb/in (TD).
   2) Coated Film: 245 lb/in (MD) / 265 lb/in (TD).
e. Percent Elongation at Break (ASTM D882):
   1) Base Film: 115 % (MD) / 115 % (TD).
   2) Coated Film: 132 % (MD) / 130 % (TD).
f. Yield Strength:
   1) Base Film: 12,000 psi (MD).
   2) Coated Film: 15,000 psi (MD).
g. Percent Elongation at Yield (ASTM D882):
   1) Base Film: 7% (MD).
   2) Coated Film: 9% (MD).
h. Graves Tear Resistance (ASTM D1004):
   1) Maximum Force (lbs):
      (a) Base Film: 40 (MD) / 40 (TD).
      (b) Coated Film: 40 (MD) / 40 (TD).
   2) Maximum Extension (in):
      (a) Base Film: 0.45 (MD) / 0.65 (TD).
      (b) Coated Film: 0.50 (MD) / 0.57 (TD).
   3) Graves Area Tear Resistance (lbs%):
      (a) Base Film: 1,100 (MD) / 1,300 (TD).
      (b) Coated Film: 1,100 (MD) / 1,300 (TD).
i. Puncture Propagation Tear Resistance (ASTM D2582):
   1) Coated Film: 9 lbf (MD) / 10 lbf (TD).
j. Puncture Strength (ASTM D4830):
   1) Material Properties (as supplied).
   2) Coated Film: 185 lbf.

2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
3. Variation in Total Transmission across the width: Less than 2 percent over the average at any portion along the length.
4. Identification: Labeled as to Manufacturer as listed in this Section.
5. Solar Performance Properties: Film applied to 1/4 inch (6 mm) thick clear glass.
   a. Visible Light Transmission (ASTM E 903): 87 percent.
   b. Visible Reflection (ASTM E 903): Not more than 10 percent.
   c. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
   d. Solar Heat Gain Coefficient (ASTM E 903): 0.79
6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
   a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
   b. Safety Rating (ANSI Z97.1): Class A, Unlimited Size.
7. Impact Resistance and Pressure Cycling: Film shall pass impact of Large Missile "C" and withstand subsequent pressure cycling (per ASTM E1996 and ASTM E1886) at +/ 75 psf Design Pressure with use of 3M Impact Protection Adhesive. Film applied to 1/4-inch tempered glass.
8. Blast Hazard Mitigation:
   a. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 7 psi and 44 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass and 3M Impact Protection Profile Attachment system
   b. GSA Rating of "2"/ ASTM F1642 "Minimal Hazard" with blast pressure of 7 psi and 43 psi*msec blast impulse, on 1/4 inch (6 mm) tempered single pane glass and 3M Impact Protection Profile Attachment system

c. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 9 psi and 62 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass and 3M Impact Protection Adhesive Attachment system
d. GSA Rating of "2" / ASTM F1642 "No Hazard" with blast pressure of 9 psi and 63 psi*msec blast impulse, on 1/4 inch (6 mm) tempered single pane glass and 3M Impact Protection Adhesive Attachment system
e. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 9 psi and 60 psi*msec blast impulse, on 1 inch (25 mm) annealed double pane glass and 3M Impact Protection Profile Attachment system
f. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 10 psi and 89 psi*msec blast impulse, on 1 inch (25 mm) annealed double pane glass and 3M Impact Protection Adhesive Attachment system
g. GSA Rating of "3B" / ASTM F1642 "Very Low Hazard" with blast pressure of 4 psi and 28 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass, daylight applied film (no attachment)
h. GSA Rating of "3B" / ASTM F1642 "Very Low Hazard" with blast pressure of 4 psi and 28 psi*msec blast impulse, on 1/4 inch (6 mm) tempered single pane glass, daylight applied film (no attachment)
i. GSA Rating of "3B" / ASTM F1642 "Low Hazard" with blast pressure of 7 psi and 42 psi*msec blast impulse, on 1 inch (25 mm) annealed double pane glass, daylight applied film (no attachment)

9. Forced Entry Resistance: Product shall have been evaluated for time to resist complete body passage by a qualified 3rd Party test lab.

2.03 MICROLAYERED SAFETY AND SECURITY WINDOW FILM WITH SUN CONTROL

A. 3M Scotchshield Ultra Prestige S70: Optically clear micro-layered polyester, laminated to an optically clear multi-layered polyester film containing at least 220 layers with a pressure sensitive adhesive on one side and durable acrylic abrasion resistant coating on the other side. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. Films contain no metals, but so contain infrared-absorbing carbon, metal oxide particles, or both.

1. Physical / Mechanical Performance Properties:
   a. Film Color: Virtually clear with at least 220 layers.
   b. Thickness: Nominal 8.0 mils
   c. Tensile Strength (ASTM D 882): 24,000 psi (MD) / 26,000 psi (TD)
   d. Break Strength (ASTM D 882): 200 lbs/in (MD) / 215 lbs/in (TD)
   e. Percent Elongation at Break (ASTM D882): 104% (MD) / 118% (TD)
   f. Yield Strength (ASTM D882): 16,000 psi (MD)
   g. Percent Elongation at Yield (ASTM D882): 8% (MD)
   h. Graves Tear Resistance (AASTM D1004):
      1) Maximum Force: 35 lbs (MD) / 36 lbs (TD)
      2) Maximum Strain: 56% (MD) / 50% (TD)
      3) Graves Area Tear Resistance: 1,100 lbs% (MD) / 1,100 lbs% (TD)
   i. Puncture Propagation Tear (ASTM D 2582): 10 lbf
2. Solar Performance Properties: Film applied to 1/4 Inch thick clear glass.
   a. Visible Light Transmission (ASTM E 903): 68 percent.
   b. Visible Reflection (ASTM E 903): Not more than 10 percent.
   c. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
   d. Solar Heat Gain Coefficient (ASTM E 903): 0.51
   e. Total Solar Energy Rejected: 50%
3. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.

4. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
5. Identification: Labeled as to Manufacturer as listed in this Section.
6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
    a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
7. Impact Resistance and Pressure Cycling:
    a. Safety film component shall pass impact of Small Missile "A" and withstand subsequent pressure cycling (per ASTM E 1996 and E 1886) at +/- 80 psf Design Pressure with use of 3M Impact Protection Adhesive attachment system.
8. Blast Hazard Mitigation: Independent testing with results from high explosive arena blast testing.
    a. GSA Rating of "2" / ASTM F1642 "No Hazard" with minimum blast load of 6 psi and 45 psi*msec, on 1/4 inch (6 mm) single pane tempered glass and 3M Impact Protection Adhesive film attachment system.
    b. GSA Rating of "2" / ASTM F1642 "No Hazard" with minimum blast load of 9 psi and 60 psi*msec, on 1 inch (25 mm) double pane tempered glass and 3M Impact Protection Adhesive film attachment system.

B. 3M Scotchshield Ultra Prestige S50: Optically clear micro-layered polyester, laminated to an optically clear multi-layered polyester film containing at least 220 layers with a pressure sensitive adhesive on one side and durable acrylic abrasion resistant coating on the other side. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. Films contain no metals, but so contain infrared-absorbing carbon, metal oxide particles, or both.
    1. Physical / Mechanical Performance Properties:
        a. Film Color: Lightly tinted with at least 220 layers.
        b. Thickness: Nominal 8.0 mils
        c. Tensile Strength (ASTM D 882): 25,000 psi (MD) / 26,000 psi (TD)
        d. Break Strength (ASTM D 882): 210 lbs/in (MD) / 220 lbs/in (TD)
        e. Percent Elongation at Break (ASTM D882): 111% (MD) / 102% (TD)
        f. Yield Strength (ASTM D882): 16,000 psi (MD)
        g. Percent Elongation at Yield (ASTM D882): 8% (MD)
        h. Graves Tear Resistance (ASTM D1004):
            1) Maximum Force: 36 lbs (MD) / 36 lbs (TD)
            2) Maximum Strain: 50% (MD) / 50% (TD)
            3) Graves Area Tear Resistance: 1,100 lbs% (MD) / 1,100 lbs% (TD)
        i. Puncture Propagation Tear (ASTM D 2582): 10 lbf
    2. Solar Performance Properties: Film applied to 1/4 Inch thick clear glass.
        a. Visible Light Transmission (ASTM E 903): 48 percent.
        b. Visible Reflection (ASTM E 903): Not more than 10 percent.
        c. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
        d. Solar Heat Gain Coefficient (ASTM E 903): 0.44
        e. Total Solar Energy Rejected: 56%
    3. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
    4. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
    5. Identification: Labeled as to Manufacturer as listed in this Section.
    6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
        a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
    7. Impact Resistance and Pressure Cycling:

a. Safety film component shall pass impact of Small Missile "A" and withstand subsequent pressure cycling (per ASTM E 1996 and E 1886) at +/- 80 psf Design Pressure with use of 3M Impact Protection Adhesive attachment system.

8. Blast Hazard Mitigation: Independent testing with results from high explosive arena blast testing.
   a. GSA Rating of "2" / ASTM F1642 "No Hazard" with minimum blast load of 6 psi and 45 psi*msec, on 1/4 inch (6 mm) single pane tempered glass and 3M Impact Protection Adhesive film attachment system.
   b. GSA Rating of "2" / ASTM F1642 "No Hazard" with minimum blast load of 9 psi and 60 psi*msec, on 1 inch (25 mm) double pane tempered glass and 3M Impact Protection Adhesive film attachment system.

C. 3M Scotchshield Ultra Night Vision S25: Optically clear polyester film comprised of co-extruded micro-layers, laminated to a metalized polyester film. Additional film layer is added for color and performance, with a durable abrasion resistant coating over one surface and a pressure sensitive adhesive on the other. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. The film color is derived from the metal coating and the product will not contain dyed polyester.
   1. Physical / Mechanical Performance Properties:
      a. Film Color: Moderately tinted.
      b. Thickness: Nominal 8.0 mils
      c. Tensile Strength (ASTM D 882): 28,000 psi (MD) / 27,000 psi (TD)
      d. Break Strength (ASTM D 882): 235 lbs/in (MD) / 230 lbs/in (TD)
      e. Percent Elongation at Break (ASTM D882): 120% (MD) / 85% (TD)
      f. Yield Strength (ASTM D882): 17,000 psi (MD)
      g. Percent Elongation at Yield (ASTM D882): 8% (MD)
      h. Graves Tear Resistance (ASTM D1004):
         1) Maximum Force: 37 lbs (MD) / 38 lbs (TD)
         2) Maximum Strain: 49% (MD) / 46% (TD)
         3) Graves Area Tear Resistance: 1,100 lbs% (MD) / 900 lbs% TD)
      i. Puncture Propagation Tear (ASTM D 2582): 10 lbf
   2. Solar Performance Properties: Film applied to 1/4 Inch thick clear glass.
      a. Visible Light Transmission (ASTM E 903): 24 percent.
      b. Visible Reflection (ASTM E 903): Not more than 20 percent exterior / 7% interior.
      c. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
      d. Solar Heat Gain Coefficient (ASTM E 903): 0.40
      e. Total Solar Energy Rejected: 60%
   3. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
   4. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
   5. Identification: Labeled as to Manufacturer as listed in this Section.
   6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
      a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
      b. Safety Rating (ANSI Z97.1): Class A, Unlimited Size.
   7. Impact and Pressure Cycling:
      a. Safety film component shall pass impact of Small Missile "A" and withstand subsequent pressure cycling (per ASTM E 1996 and E 1886) at +/- 80 psf Design Pressure with use of 3M Impact Protection Adhesive attachment system.
   8. Blast Hazard Mitigation: Independent testing with results from high explosive arena blast testing.

a. GSA Rating of "2" / ASTM F1642 "No Hazard" with minimum blast load of 6 psi and 43 psi*msec, on 1/4 inch (6 mm) single pane annealed glass and 3M Impact Protection Adhesive film attachment system.
b. GSA Rating of "2" / ASTM F1642 "No Hazard" with minimum blast load of 6 psi and 45 psi*msec, on 1/4 inch (6 mm) single pane tempered glass and 3M Impact Protection Adhesive film attachment system.
c. GSA Rating of "3B" / ASTM F1642 "Minimal Hazard" with minimum blast load of 5 psi and 32 psi*msec, on 1/4 inch (6 mm) single pane tempered glass and 3M Impact Protection Profile film attachment system.
d. GSA Rating of "2" / ASTM F1642 "No Hazard" with minimum blast load of 5 psi and 35 psi*msec, on 1 inch (25 mm) double pane annealed glass and 3M Impact Protection Profile film attachment system
e. GSA Rating of "2" / ASTM F1642 "No Hazard" with minimum blast load of 9 psi and 61 psi*msec, on 1 inch (25 mm) double pane tempered glass and 3M Impact Protection Adhesive film attachment system

2.04 CLEAR SAFETY AND SECURITY WINDOW FILM

A. 3M Safety S40 (SH4CLARL): Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass.
   1. Physical / Mechanical Performance Properties:
      a. Film Color: Clear.
      b. Thickness: Nominal 4.0 mils
      c. Tensile Strength (ASTM D 882): 25,000 psi.
      d. Elongation: 130 percent.
      e. Break Strength (ASTM D 882): 100 lbs/in
   2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
   3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
   4. Identification: Labeled as to Manufacturer as listed in this Section.
   5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
      a. Visible Light Transmission (ASTM E 903): 87 percent.
      b. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.
   6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
      a. Safety Rating (CPSC 16 CFR, Part 1201): Category I (150 ft.-lbs).
      b. Safety Rating (ANSI Z97.1): Class B, Unlimited Size.

B. 3M Safety S70 (SH7CLARL): Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other.
   1. Physical / Mechanical Performance Properties:
      a. Film Color: Clear.
      b. Thickness: Nominal 7.0 mils
      c. Tensile Strength (ASTM D 882): 25,000 psi.
      d. Break Strength (ASTM D 882): 175 lbs/in.
   2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
   3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
   4. Identification: Labeled as to Manufacturer as listed in this Section.
   5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.

a. Visible Light Transmission (ASTM E 903): 87 percent.
b. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.

6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
   a. Safety Rating (CPSC 16 CFR, Part 1201): Category I (150 ft.-lbs).
7. Blast Hazard Mitigation: Independent testing with results from high explosive arena blast testing.
   a. GSA Rating of "3B" with minimum blast load of 4 psi and 28 psi*msec, on 1/4 inch single pane annealed glass and 3M Impact Protection Adhesive film attachment system.
   b. GSA Rating of "3B" with minimum blast load of 10 psi and 89 psi*msec, on 1 inch (25 mm) double pane annealed glass and 3M Impact Protection Adhesive film attachment system.

C. 3M Safety S80 (SH8CLARL): Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. The film may be laminated to other clear polyester film layers to achieve the desired thickness of the film.
   1. Physical / Mechanical Performance Properties:
      a. Film Color: Clear.
      b. Thickness: Nominal 8 mils.
      c. Tensile Strength (ASTM D 882): 25,000 psi.
      d. Break Strength (ASTM D 882): 200 lbs/in
   2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
   3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
   4. Identification: Labeled as to Manufacturer as listed in this Section.
   5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
      a. Visible Light Transmission (ASTM E 903): 87 percent.
      b. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.
   6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
      a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
      b. Safety Rating (ANSI Z97.1): Class A, Unlimited Size.
   7. Blast Hazard Mitigation:
      a. GSA Rating of "3B" / ASTM F1642 "Minimal Hazard" with minimum blast load of 6 psi and 41 psi*msec, on 1/4 inch (6 mm) single pane annealed glass and 3M Impact Protection Adhesive film attachment system.
      b. GSA Rating of "3B" with minimum blast load of 7 psi and 41 psi*msec, on 1/4 inch single pane annealed glass and 3M Impact Protection Profile film attachment system.
      c. GSA Rating of "3B" with minimum blast load of 4 psi and 29 psi*msec, on 1/4 inch single pane annealed or tempered glass without use of film attachment system.
      d. GSA Rating of "2" with minimum blast load of 12 psi and 66 psi*msec, on 1 inch double pane annealed glass and 3M Impact Protection Adhesive film attachment system.
      e. GSA Rating of "3B" with minimum blast load of 14 psi and 63 psi*msec, on 1 inch double pane annealed glass and 3M Impact Protection Profile film attachment system.

D. 3M Safety S140 (SH14CLARL): Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. The film may be laminated to other clear polyester film layers to achieve the desired thickness of the film.
   1. Physical / Mechanical Performance Properties:
      a. Film Color: Clear.

b. Thickness: Nominal 14 mils
c. Tensile Strength (ASTM D 882): 25,000 psi.
d. Break Strength (ASTM D 882) (Per Inch Width): 350 lbs.

2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
4. Identification: Labeled as to Manufacturer as listed in this Section.
5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
   a. Visible Light Transmission (ASTM E 903): 85 percent.
   b. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.
6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
   a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
7. Impact Resistance and Pressure Cycling:
   a. Film shall pass impact of Medium Large Missile "C" and withstand subsequent pressure cycling (per ASTM E 1996 and E 1886) at +/- 50 psf Design Pressure with use of 3M Impact Protection Adhesive attachment system.
8. Blast Hazard Mitigation: Independent testing with results from high explosive arena blast testing.
   a. GSA Rating of "3B" with minimum blast load of 8 psi and 44 psi*msec, on 1/4 inch single pane annealed glass and 3M Impact Protection Profile film attachment system.
   b. GSA level 3B rating with minimum blast load of 15 psi overpressure and 58 psi*msec blast impulse on 1 inch double pane annealed glass without use of film attachment system.
9. Forced Entry Protection: Independent lab testing according to UL 972 protocol (Multiple Impact Test).
   a. Annealed Glass (1/4 inch) - Pass
   b. Tempered Glass (1/4 inch) - Pass

E. 3M Safety Exterior S20: Optically clear polyester film with an exterior durable abrasion resistant coating over one surface and a pressure sensitive adhesive over the other.
1. Physical / Mechanical Performance Properties:
   a. Film Color: Clear.
   b. Thickness: Nominal 2 mils
   c. Tensile Strength (ASTM D 882): 25,000 psi.
   d. Elongation: 88 percent.
   e. Break Strength (ASTM D 882): 50 lbs/in
2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
4. Identification: Labeled as to Manufacturer as listed in this Section.
5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
   a. Visible Light Transmission (ASTM E 903): 88 percent.
   b. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
   a. Safety Rating (CPSC 16 CFR, Part 1201): Category I (150 ft.-lbs).
   b. Safety Rating (ANSI Z97.1): Class B, Unlimited Size.

F. 3M Safety Exterior S40. Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other.
1. Physical / Mechanical Performance Properties:

a. Film Color: Clear.
b. Thickness: Nominal 4 mils
c. Tensile Strength (ASTM D 882): 25,000 psi.
d. Break Strength (ASTM D 882): 100 lbs/in.

2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
4. Identification: Labeled as to Manufacturer as listed in this Section.
5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
   a. Visible Light Transmission (ASTM E 903): 89 percent.
   b. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
   a. Safety Rating (CPSC 16 CFR, Part 1201): Category I (150 ft.-lbs).

G. 3M Safety Exterior S70. Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other.
1. Physical / Mechanical Performance Properties:
   a. Film Color: Clear.
   b. Thickness: Nominal 7 mils
   c. Tensile Strength (ASTM D 882): 25,000 psi.
   d. Break Strength (ASTM D 882): 140 lbs/in.
2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
4. Identification: Labeled as to Manufacturer as listed in this Section.
5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
   a. Visible Light Transmission (ASTM E 903): 88 percent.
   b. Ultraviolet Transmission (ASTM E 903): Less than 0.5 percent.
6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
   a. Safety Rating (CPSC 16 CFR, Part 1201): Category I (150 ft.-lbs).

2.05 SAFETY AND SECURITY WINDOW FILM WITH SUN CONTROL

A. 3M Safety Neutral S35. Dual reflective polyester film, nominally 8 mils (0.008") thick, with a durable abrasion resistant coating over one surface and a pressure sensitive adhesive on the other. The film is comprised of an optically clear safety film laminated to a metalized film layer for reflective and sun control properties. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass.
1. Physical / Mechanical Performance Properties (nominal):
   a. Film Color: Neutral
   b. Film Thickness (excluding coatings or adhesive liner): Nominal 8 mils
   c. Tensile Strength 33,000 psi (MD) / 23,000 psi (TD)
   d. Break Strength: 170 lb/in (MD) / 280 lb/in (TD)
   e. Percent Elongation at Break: 100 % (MD) / 80 % (TD)
   f. Yield Strength: 23,000 psi
   g. Percent Elongation at Yield: 80%
2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
3. Variation in Total Transmission across the width: Less than 2 percent over the average at any portion along the length.
4. Identification: Labeled as to Manufacturer as listed in this Section.

5. Solar Performance Properties: Film applied to 1/4 inch (6 mm) thick clear glass (NFRC 100/200).
    a. Visible Light Transmission: 39%
    b. Visible Reflection: 23% exterior / 13% interior
    c. Ultraviolet Transmission: Not more than 1%.
    d. Solar Heat Gain Coefficient: 0.43
6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
    a. Safety Rating (CPSC 16 CFR, Part 1201): Category 2 (400 ft.-lbs).
    b. Safety Rating (ANSI Z97.1): Class A, Unlimited (400 ft.-lbs).
7. Impact Resistance and Pressure Cycling
    a. Film shall pass impact of Large Missile "C" and withstand subsequent pressure cycling (per ASTM E1996 and ASTM E1886) at +/- 60 psf Design Pressure with use of 3M Impact Protection Adhesive attachment system. Tested on 1/4 inch (6 mm) tempered glass.
8. Blast Hazard Mitigation:
    a. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 4 psi and 28 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass and 3M Impact Protection Profile Attachment system
    b. GSA Rating of "2"/ ASTM F1642 "Minimal Hazard" with blast pressure of 6 psi and 42 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass and 3M Impact Protection Adhesive Attachment system
    c. GSA Rating of "2" / ASTM F1642 "No Hazard" with blast pressure of 4 psi and 28 psi*msec blast impulse, on 1/4 inch (6 mm) tempered single pane glass and 3M Impact Protection Adhesive Attachment system
    d. GSA Rating of "2" / ASTM F1642 "No Hazard" with blast pressure of 6 psi and 42 psi*msec blast impulse, on 1 inch (25 mm) double pane tempered glass and 3M Impact Protection Adhesive Attachment system

B. 3M Safety Silver S20. Highly reflective polyester film, nominally 8 mils (0.008") thick, with a durable abrasion resistant coating over one surface and a pressure sensitive adhesive on the other. The film is comprised of an optically clear safety film laminated to a metalized film layer for reflective and sun control properties. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass.
    1. Physical / Mechanical Performance Properties (nominal):
        a. Film Color: Silver reflective
        b. Film Thickness (excluding coatings or adhesive liner): Nominal 8 mils
        c. Tensile Strength: 20,000 psi (MD) / 30,000 psi (TD)
        d. Break Strength: 160 lb/in (MD) / 247 lb/in (TD)
        e. Percent Elongation at Break: 95 % (MD) / 76 % (TD)
        f. Yield Strength: 15,000 psi
        g. Percent Elongation at Yield: 7%
    2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
    3. Variation in Total Transmission across the width: Less than 2 percent over the average at any portion along the length.
    4. Identification: Labeled as to Manufacturer as listed in this Section.
    5. Solar Performance Properties: Film applied to 1/4 inch (6 mm) thick clear glass (NFRC 100/200).
        a. Visible Light Transmission: 18%
        b. Visible Reflection: 61%
        c. Ultraviolet Transmission: Not more than 1%.
        d. Solar Heat Gain Coefficient: 0.25

6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
    a. Safety Rating (CPSC 16 CFR, Part 1201): Category 2 (400 ft-lbs).
    b. Safety Rating (ANSI Z97.1): Class A, Unlimited (400 ft-lbs).
7. Impact Resistance and Pressure Cycling
    a. Film shall pass impact of Small Missile "A" and withstand subsequent pressure cycling (per ASTM E1996 and ASTM E1886) at +/- 60 psf Design Pressure with use of 3M Impact Protection Adhesive attachment system. Tested on 1/4 inch (6 mm) tempered glass.
8. Blast Hazard Mitigation:
    a. GSA Rating of "2" / ASTM F1642 "Minimal Hazard" with blast pressure of 4 psi and 28 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass and 3M Impact Protection Profile Attachment system
    b. GSA Rating of "2"/ ASTM F1642 "Minimal Hazard" with blast pressure of 6 psi and 42 psi*msec blast impulse, on 1/4 inch (6 mm) annealed single pane glass and 3M Impact Protection Adhesive Attachment system
    c. GSA Rating of "2" / ASTM F1642 "No Hazard" with blast pressure of 4 psi and 28 psi*msec blast impulse, on 1/4 inch (6 mm) tempered single pane glass and 3M Impact Protection Adhesive Attachment system
    d. GSA Rating of "2" / ASTM F1642 "No Hazard" with blast pressure of 6 psi and 42 psi*msec blast impulse, on 1 inch (25 mm) double pane tempered glass and 3M Impact Protection Adhesive Attachment system

2.06 ANTI-GRAFFITI WINDOW FILM

A. 3M Anti-Graffiti 4 (AG-4): Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The film may be laminated to other clear polyester film layers to achieve the desired thickness of the film.
    1. Physical / Mechanical Performance Properties:
        a. Film Color: Clear.
        b. Thickness: Nominal 4.0 mils
        c. Tensile Strength (ASTM D 882): 25,000 psi.
        d. Break Strength (ASTM D 882) (Per Inch Width): 136 lbs.
        e. Elongation at Break (ASTM D 882): > 100 percent.
        f. Peel Strength: 1 lb/inch.
        g. Puncture Strength (ASTM D 4830): 90 lbs.
        h. Abrasion Resistance (ASTM D1044): < 2 percent increase in haze.
    2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
    3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
    4. Identification: Labeled as to Manufacturer as listed in this Section.
    5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
        a. Visible Light Transmission (ASTM E 903): 81 percent.
        b. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.

B. 3M Anti-Graffiti 6 (AG-6): Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The film may be laminated to other clear polyester film layers to achieve the desired thickness of the film.
    1. Physical / Mechanical Performance Properties:
        a. Film Color: Clear.
        b. Thickness: Nominal 6.0 mils
        c. Tensile Strength (ASTM D 882): 25,000 psi.
        d. Break Strength (ASTM D 882): 150 lbs/in

e. Elongation at Break (ASTM D 882): > 100 percent.
f. Peel Strength: 1 lb/inch.
g. Puncture Strength (ASTM D 4830): 125 lbs.
h. Abrasion Resistance (ASTM D 1044): < 2 percent increase in haze.

2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
4. Identification: Labeled as to Manufacturer as listed in this Section.
5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
   a. Visible Light Transmission (ASTM E 903): 87 percent.
   b. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.

2.07 3M IMPACT PROTECTION FILM ATTACHMENT SYSTEMS

A. 3M Impact Protection Adhesive (IPA): Weatherable, UV-resistant, moisture curable structural sealant wet glaze.
   1. Color:
      a. Black.
      b. White.
   2. Material Properties (as supplied):
      a. Typical Cure Time: 3 - 7 days (25 degrees C, 50% RH)
      b. Full Adhesion: 7 - 14 days
      c. Tack-Free Time (ASTM D 5895): 21 minutes (25 degrees C, 50% RH)
      d. Flow, Sag or Slump (ASTM D 2202): 0 inches
      e. Specific Gravity: 1.4
      f. Working Time: 10 - 20 minutes (25 degrees C, 50% RH)
      g. VOC Content: 16 g/L
   3. Material Properties (as cured - 21 days at 25 degrees C, 50% RH):
      a. Ultimate Tensile Strength (ASTM D412): 380 psi (2.62 MPa)
      b. Ultimate Elongation (ASTM D412): 640 psi
      c. Durometer Hardness, Shore A (ASTM D2240): 38-39 points
      d. Tear Strength, Die B (ASTM D624): 72 ppi
   4. Uniformity: Product shall have uniform consistency and appearance, with no clumping.
   5. Impact Resistance and Pressure Cycling:
      a. As part of a filmed glass system, film attachment shall demonstrate ability to withstand Medium Large Missile C and Small Missile A impact, with subsequent pressure cycling (per ASTM E 1996 and ASTM E 1886) at +/- 75 psf design pressure.
      b. As part of a filmed glass system, film attachment shall demonstrate ability withstand structural load requirements of ASTM E330 when tested at +/ 100 psf design pressure.
   6. Blast Hazard Mitigation:
      a. GSA level "2" rating (minimal hazard) of "2" with minimum blast load of 11 psi overpressure and 55 psi*msec blast impulse.
      b. GSA level "3B" rating (low hazard) with minimum blast load of 10 psi overpressure and 89 psi*msec blast impulse.
      c. ASTM F1642 rating of "Low Hazard" with minimum blast load of 8 psi overpressure and 42 psi*msec blast impulse.

B. 3M Impact Protection Profile (IPP): Weatherable, flexible-mechanical style film attachment made of extruded rubber profile with two strips of double coated foam tape: one strip for bonding to applied film and the other strip for bonding to the window frame.
   1. 3M Impact Protection Profile, BP-700.
      a. Total width: 1.0 inches.

   b. Tape width: 0.5 inches.
2. 3M Impact Protection Profile, BP-950.
   a. Total width: 1.3 inches.
   b. Tape width: 0.625 inches.
3. 3M Impact Protection Profile, BP-950 XL.
   a. Total width: 1.3 inches.
   b. Tape width: 0.38 inches.
4. Material Properties:
   a. Full Adhesion: 1 - 2 days (25 degrees C, 50% RH)
   b. Ultimate Tensile Strength (AASTM D412): > 20,500 psi
   c. Ultimate Elongation (ASTM D412): 400%
   d. Break Strength, Die B (ASTM D624): > 71 ppi
   e. Durometer Hardness, Shore A: (ASTM D2240): 70 pts
5. Uniformity: Product shall have uniform consistency and appearance.
6. Impact Resistance and Pressure Cycling:
   a. As part of a filmed glass system, film attachment shall demonstrate ability to withstand Small Missile A impact, with subsequent pressure cycling (per ASTMs E 1996 and E 1886) at +/- 50 psf design pressure.
7. Blast Hazard Mitigation:
   a. GSA level "2" rating (minimal hazard) with minimum blast load of 4 psi overpressure and 28 psi*msec blast impulse.
   b. GSA level "3B" rating (low hazard) with minimum blast load of 10 psi overpressure and 89 psi*msec blast impulse.
   c. ASTM F1642 rating of "Low Hazard" with minimum blast load of 4 psi overpressure and 28 psi*msec blast impulse.

PART 3 EXECUTION

3.01 EXAMINATION

A. Film Examination:
   1. If preparation of glass surfaces is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
   2. Glass surfaces receiving new film should first be examined to verify that they are free from defects and imperfections, which will affect the final appearance.
   3. Do not proceed with installation until glass surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.
   4. Commencement of installation constitutes acceptance of conditions.

B. Impact Protection Adhesive Examination:
   1. If application of window film is/was the responsibility of another installer, notification in writing shall be made of deviations from manufacturer's recommended installation tolerances and conditions.
   2. Filmed glass surfaces receiving new attachment should first be examined to verify that they are free from defects and imperfections, and that the film edges extend sufficiently to the frame edges.
   3. Do not proceed with installation until film and frame surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.

4. Conduct an adhesion test to the frame surface may be conducted by applying a 4 - 6 inch long bead, approximately 0.5 - 1 inch in width, masking one side of the frame surface underneath the strip with tape. Allow the Impact Protection Adhesive to cure for 7 days and test adhesion by pulling up on the masked end and a 90 degree angle. If cohesive failure is observed (adhesive residue left behind on the frame surface), adhesion is acceptable; if adhesive failure is observed (clean peel from the frame), adhesion is unacceptable and product is not recommended.

C. Impact Protection Profile Examination:
1. If application of window film is/was the responsibility of another installer, notification in writing shall be made of deviations from manufacturer's recommended installation tolerances and conditions.
2. Windows and frames must be examined to ensure that they are fit to receive the Impact Protection Profile in a manner such that the two profile adhesive strips will be perpendicularly opposed to each other and that they will not contact glazing stops or frame gaskets without stretching the profile.
3. Filmed glass surfaces receiving new attachment should first be examined to verify that they are free from defects and imperfections, and that the film edges extend sufficiently to the frame edges.
4. Do not proceed with installation until film and frame surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.
5. Conduct an adhesion test to the frame surface may be conducted by applying a 4 - 6 inch long strip on the frame surface, using the sufficient pressure to achieve good adhesive wet-out. Allow the Impact Protection Profile to cure for 1-2 days and test adhesion by removing the test strip. If cohesive failure is observed (adhesive residue left behind on the frame surface), adhesion is acceptable; if adhesive failure is observed (clean peel from the frame), adhesion is unacceptable and product is either not recommended, or an adhesion promoter, such as 3M Primer 94, must be used.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Refer to Manufacturer's installation instructions for methods of preparation for Impact Protection Adhesive or Impact Protection Profile film attachment systems.

3.03 INSTALLATION

A. Film Installation:
1. Install in accordance with manufacturer's instructions.
2. Cut film edges neatly and square at a uniform distance of 1/8 inch (3 mm) to 1/16 inch (1.5 mm) of window sealant. Use new blade tips after 3 to 4 cuts.
3. Spray the slip solution, composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, on window glass and adhesive to facilitate proper positioning of film.
4. Apply film to glass and lightly spray film with slip solution.
5. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
6. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.
7. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

B. Impact Protection Adhesive Installation:
   1. The film attachment system shall be applied according to the specifications of the Manufacturer by an Authorized Dealer/Applicator. Refer to 3M publication, 70-0709-0322-7, 3M Impact Protection Adhesive Attachment System Installation Instructions.
      a. For blast hazard mitigation: minimum 1/2 inch bead overlap on both frame and film (excluding glazing stops or compression gaskets).
      b. For impact resistance and building envelope protection: minimum 3/8 inch bead overlap on both frame and film (excluding glazing stops or compression gaskets).
   2. To ensure a straight and consistent bead width is achieved, masking tape may be applied to film and frame surfaces prior to application.
   3. With prior approval of the building owner or property manager, existing compression gaskets may be partially removed or trimmed to allow for a thinner bead and stronger anchorage. If removing the gaskets, sections shall be trimmed approximately 3 inches in length and inserted with appropriate spacing along all sides of the window to help secure the glazing during application and curing of the Impact Protection Adhesive.
   4. The Impact Protection Adhesive shall be dispensed with a caulk gun with nozzle opening diameter sized to match the approximate size of the desired bead width.
   5. A plastic putty knife or other tool with a clean straight edge shall be used to trowel and smooth out the adhesive. The completed adhesive bead shall be relatively triangular in shape.
   6. Any masking tape used shall be carefully removed within 10 minutes after applying the wet glaze.

C. Impact Protection Profile Installation:
   1. The film attachment system shall be applied according to the specifications of the Manufacturer by an Authorized Dealer/Applicator trained to install 3M Impact Protection Profile. Refer to 3M publication, 3M Impact Protection Profile Installation Systems Instructions.
   2. Each profile piece must span continuously to both sides of the window, within 1/8 inch to the frame edge. Splicing the profile between frame edges is prohibited.
   3. Profile must be aligned and applied by 3M recommended or approved methods and tools to ensure a quality installation.
   4. Corner joints must be fabricated by 3M recommended and approved methods. No part of the profile adhesive shall make contact with an adjacent profile.
   5. Sufficient pressure must be evenly applied along the entire length of the profile to ensure full adhesion from both adhesive strips. A roller tool is required to minimize entrapment of air in the adhesive.

3.04 CLEANING AND PROTECTION

A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

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. Gypsum plastering on expanded-metal lath.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

1.04 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
   1. Build mockups for each substrate and finish texture indicated for gypsum plastering, including accessories.
      a. Size: 100 sq. ft. (9 sq. m) in surface area.
   2. Simulate finished lighting conditions for review of mockups.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, contamination, corrosion, construction traffic, and other causes.

1.06 FIELD CONDITIONS

A. Comply with ASTM C842 requirements or gypsum plaster manufacturer's written recommendations, whichever are more stringent.

B. Room Temperatures: Maintain temperatures at not less than 55 degrees F (13 degrees C) or greater than 80 degrees F (27 degrees C) for at least seven days before application of gypsum plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.

C. Avoid conditions that result in gypsum plaster drying out too quickly.
   1. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
   2. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.
   3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

PART 2 - PRODUCTS

2.01 EXPANDED-METAL LATH

A. Expanded-Metal Lath: ASTM C847, cold-rolled carbon-steel sheet with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. ClarkDietrich Building Systems.
   b. MarinoWARE.
3. Flat-Rib Lath: Rib depth of not more than 1/8 inch (3 mm), 3.4 lb/sq. yd. (1.8 kg/sq. m).

2.02 ACCESSORIES

A. General: Comply with ASTM C841, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:
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. ClarkDietrich Building Systems.
   b. MarinoWARE.
2. Cornerite: Fabricated from expanded-metal lath with ASTM A653/A653M, G60 (Z180), hot-dip galvanized-zinc coating.
3. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.
4. Casing Beads: Fabricated from zinc; square-edged style; with expanded flanges.
5. Control Joints: Fabricated from zinc; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
6. Two-Piece Expansion Joints: Fabricated from zinc; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch (6 to 16 mm) wide; with perforated flanges.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated on Drawings.
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. Fry Reglet Corporation.
   b. Gordon, Inc.
   c. MM Systems Corporation.
   d. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Finish: Insert requirements for anodic or other factory-applied coatings.

2.03 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Bonding Compound: ASTM C631.

C. Fasteners for Attaching Metal Lath to Substrates: ASTM C841.

D. Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter unless otherwise indicated.

E. Mix Additives: Use gypsum plaster accelerators and retarders from plaster manufacturer if required by Project conditions. Use only additives that manufacturer recommends in writing for use with plaster to which it is added.

2.04 BASE-COAT PLASTER MATERIALS

A. Recycled Content of Gypsum Plaster: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent.

B. High-Strength Gypsum Neat Plaster: ASTM C28/C28M, with a minimum, average, dry compressive strength of 2800 psi (19 MPa) according to ASTM C472 for a mix of 100 lb (45 kg) of plaster and 2 cu. ft. (0.06 cu. m) of sand.
   1. Products: Subject to compliance with requirements, provide the following:
      a. USG Corporation; Structo-Base.

C. Aggregates for Base-Coat Plasters: ASTM C35, sand.

2.05 FINISH-COAT PLASTER MATERIALS

A. Gypsum Ready-Mixed Finish Plaster: Manufacturer's standard, mill-mixed, gaged, interior finish.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. USG Corporation; Imperial Veneer Finish Plaster.
      b. Or approved equal.

2.06 PLASTER MIXES

A. Mixing: Comply with ASTM C842 and manufacturer's written instructions for applications indicated.

B. Mix Additives: Use accelerators and retarders, if required by Project conditions, according to manufacturer's written instructions.

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 the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

3.03 INSTALLATION, GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

B. STC-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

C. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.04 INSTALLING EXPANDED-METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C841.

3.05 INSTALLING ACCESSORIES

A. General: Install according to ASTM C841.

B. Cornerbeads: Install at external corners.

C. Casing Beads: Install at terminations of plasterwork, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or frames act as casing beads.

D. Control Joints: Locate as approved by Architect for visual effect, with spacing between joints in either direction not exceeding the following:
   1. Partitions: 30 feet (9 m).
   2. Ceilings: 30 feet (9 m).

E. Aluminum Trim: Install according to manufacturer's written instructions.

3.06 PLASTER APPLICATION

A. General: Comply with ASTM C842.
   1. Do not deviate more than plus or minus 1/8 inch in 10 feet (3 mm in 3 m) from a true plane in finished plaster surfaces when measured by a 10-foot (3-m) straightedge placed on surface.
   2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
   3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on substrates for direct application of plaster.

C. Base-Coat Plaster:
   1. Over Expanded-Metal Lath:
      a. Scratch Coat: High-strength gypsum neat plaster with job-mixed sand.
      b. Brown Coat: High-strength gypsum neat plaster with job-mixed sand.
   2. Over Unit Masonry: Gypsum neat plaster with job-mixed sand.
   3. Over Monolithic Concrete: Gypsum neat plaster with job-mixed sand.

D. Finish Coats:
   1. Smooth-Troweled Finishes:
      a. Materials: High-strength gypsum gaging plaster and lime putty.
      b. Locations: Provide smooth-troweled finish unless otherwise indicated.

E. Concealed Plaster:
   1. Where plaster application is concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
   2. Where plaster application is concealed above suspended ceilings and in similar locations, omit finish coat.
   3. Where plaster application is used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.07 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.08 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

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. Acoustical Ceiling Panels.
   2. Exposed Grid Suspension System.
   3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.
   4. Accessories.

1.03 STANDARDS

A. All work of this section shall conform to industry standards and manufacturer's recommendations. Where differences occur, the stricter requirement shall apply.

B. ASTM A1008 "Standard Specifications for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability".

C. ASTM A641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire".

D. ASTM C635 "Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings".

E. ASTM C636 "Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels".

F. ASTM E84 "Standard Test Method for Surface Burning Characteristics of Building Materials".

G. ASTM E580 "Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions". *{Seismic Design Category C Requirement}*

H. ASTM E1264 "Standard Classification for Acoustical Ceiling Products".

I. ASTM E1414 "Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum".

J. ASTM E1477 "Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers".

K. ASTM D3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber".

L. FS SS-S-118B "Sound Controlling (Acoustical) Tiles and Panels".

M. Ceilings & Interior Systems Contractors Association (CISCA) "Code of Practices for Acoustical Ceiling System Installations".

N. Ceilings & Interior Systems Contractors Association (CISCA) "Seismic Construction Handbook".

1.04 SUBMITTALS

A. Submit pursuant to Section 013300 - Submittal Procedures.

B. Submit pursuant to Section 016100 - Basic Product Requirements.

C. Product Data: Material cut sheets for each type of acoustical ceiling panel and suspension system required.

D. Installation Instructions: Provide manufacturer's installation instructions for each type of acoustical ceiling panel/suspension system required.

E. Maintenance and Care Instructions: Provide manufacturer's maintenance and care instructions for each type of acoustical ceiling panel/suspension system required.

F. Samples: Minimum 6”x6” samples of each style of panel, 8” long pieces of exposed wall moldings, and suspension system.

G. Warranties: Submit sample warranties applicable to each different type ceiling panel and associated suspension system.

1.05 QUALITY ASSURANCE

A. Experienced workers familiar with the work and according to manufacturer's recommendation and/or industry standards shall perform all work of this section.

B. Provide acoustical panel units and grid components by single manufacturer.

C. Coordinate work of this Section with other Work supported by or penetrating through suspended ceiling systems, including partition systems, both fixed and tracked (if any), light fixtures, HVAC equipment, fire protection systems, speakers (if any), and movie screens (if any).

D. Each carton of panel material to have Underwriter’s Laboratory classification of acoustic performance. If label is absent, Contractor shall be required to send material from every production run appearing on the site to an independent approved laboratory for testing. Panels not meeting requirements shall be replaced at Contractor’s expense.

E. Maintain installation tolerances specified in ASTM C635 and C636.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.07 JOB SITE CONDITIONS

A. Do not store or begin installation of acoustical ceiling materials until:
   1. All wet work such as concrete, plastering, and terrazzo is completed and thoroughly dried.
   2. Building has been enclosed to the weather and suitable mechanical ventilation is supplied to maintain conditional ranges of 60º F to 85º F at not more than 70% relative humidity. Maintain these conditions for a minimum of 48 hours prior to installation as well as during and after installation.
   3. Dust generating activities have terminated.
   4. Overhead work such as mechanical, electrical, fire protection, etc. is completed, tested, and approved.

B. Meet CISCA requirements for seismic design category as indicated on Structural Drawings. See CISCA Seismic Construction Handbook".

1.08 EXTRA MATERIALS

A. Furnish full size units equal to:
   1. Acoustical Ceiling Panels: 3% of the amount for each type, size, and color installed.
   2. Exposed Suspension System Components: 2% of the amount for each type, color, and finish installed.

1.09 WARRANTY

A. Provide in closeout documents manufacturer's written warranties specific to the various tile and suspension system utilized. Warranties should include if applicable to tile type:
   1. Thirty (30) year Limited System Warranty against visible sag, mold and mildew.

2. Ten (10) year replacement panel if applicable to specified panel.
3. Thirty (30) year Performance Guarantee & Warranty.
4. Ten (10) year HumiGuard® Ceiling Panel Limited Warranty.

PART 2 PRODUCTS

2.01 ACOUSTICAL CEILING PANELS

A. Acceptable Manufacturers:
   1. Armstrong World Industries, 2500 Columbia Ave., Lancaster, PA 17603. Phone: (717) 397-0611. (Basis of Design)
   2. CertainTeed Architectural, 20 Moores Rd., Malvern, PA 19355. Phone: (800) 233-8990.
   3. USG Interiors, LLC, 550 West Adams St., Chicago, IL 60661. Phone: (800) 950-3839.
   4. Acoustic Ceiling Products, LLC (ACP), PO Box 1581, Appleton, WI 54912. Phone: (800) 434-3751.
   5. Architect approved equivalent.

B. Existing rooms and areas with partial acoustical lay-in ceiling replacement:
   1. Provide new ceiling grid and acoustical ceiling tiles matching the existing ceiling system that is indicated to remain.

C. Rooms, corridors, and other areas indicated to receive new ceiling system:
   1. Corridors, vestibules, classrooms, resource rooms, storage rooms, lounges, closets, and server Rooms.
      a. Description based on School Zone® Fine Fissured™ by Armstrong.
      b. Material: Wet-formed mineral fiber.
      c. Surface Texture: Medium textured non-directional.
      d. Exposed surface color: Manufacturer's standard white finish.
      e. Panel Size: 24" x 24" x 3/4" thick.
      f. Edge Profile: Square lay-in.
      g. Noise Reduction Coefficient (NRC): 0.70.
      h. Ceiling Attenuation Clas (CAC): 40.
      i. Flame Spread: Class A.
      j. Light Reflectance: 0.82.
      k. Humidity Resistant Hum Guard Plus with 10-year warranty.
      l. Anti-mold/mildew, Anti-odor/stain/bacteria: BioBlock®.
   2. Bathrooms, Restrooms, Locker Rooms, and Shower Rooms.
      a. Description based on Cermaguard® Fine Fissured™ by Armstrong.
      b. Mineral fiber lay-in panels/cast or molded.
      c. Surface Texture: Fine fissures, non-directional, perforated.
      d. Exposed surface color: Manufacturer's standard white finish.
      e. Panel Size: 24" x 24" x 5/8" thick.
      f. Edge Profile: Square.
      g. Noise Reduction Coefficient (NRC): 0.55.
      h. Ceiling Attenuation Class (CAD): 38.
      i. Flame Spread: Fire Guard.
      j. Light Reflectance: 0.79.
      k. Humidity Resistant: HumiGuard Plus with 10-year warranty.
   3. Offices; office lobbies, conference rooms; music rooms; libraries; sound, audio, visual rooms; multi-media rooms, sensory rooms; projection rooms, reading rooms; speech and hearing rooms.
      a. Description based on Calla® Square Lay-in by Armstrong.
      b. Wet-formed mineral fiber with acoustically transparent membrane.
      c. Exposed Surface Color: Manufacturer's standard white finish.

d. Surface Texture: Smooth texture.
e. Panel Size: 24" 24" x 1".
f. Edge Profile: Square Lay-in.
g. Noise Reduction Coefficient (NRC): 0.85.
h. Ceiling Attenuation Class (CAC): 35.
i. Articulation Class: 170.
j. Fire Performance: Class A.
k. Light Reflectance: 0.85.
l. Humidity Resistant: HumiGuard Plus with 10-year warranty.
m. Anti-mold/mildew: BioBlock®.

4. Kitchen, Food Prep, Pantries, cafeterias, lunch rooms.
   a. Description based on Kitchen Zone™ Square Lay-in Smooth texture by Armstrong.
   b. Wet-formed mineral fiber.
   c. Exposed Surface Color: Manufacturer's standard white finish.
   d. Panel Size: 24" x 24" x 5/8".
   e. Edge Profile: Square.
   f. Noise Reduction Coefficient (NRC): N/A.
   g. Ceiling Attenuation Class (CAC): .33.
   h. Fire Performance: Class A.
   i. Light Reflectance: 0.89.
   j. Humidity Resistant: HumiGuard Plus with 10-year warranty.
   k. Anti-mold/mildew: BioBlock®.
   l. Panels meet USDA/FSIS guidelines for use in food processing areas.

2.02 SUSPENSION SYSTEM

A. Suspension system/steel, direct hung exposed tee:
   1. Acceptable manufacturers:
      a. Armstrong World Industries, 2500 Columbia Ave., Lancaster, PA 17603. Phone: (717) 397-0611. (Basis of Design)
      b. Rockfon® Chicago Metallic®, 4849 S. Austin Ave., Chicago, IL 60638. Phone: (800) 323-7164.
      c. USG Interiors, LLC, 550 West Adams St., Chicago, IL 60661. Phone: (800) 950-3839.
      d. Acoustic Ceiling Products, LLC (ACP), PO Box 1581, Appleton, WI 54912. Phone: (800) 434-3751.
      e. Architect approved equivalent.

B. Description based on Prelude® XL® by Armstrong or Seismic RX® Suspension System by Armstrong:
   1. Double web steel/non-fire rated.
   2. Structural Classification per ASTM C635: Intermediate duty with interlocking of main runners and cross tees.
   3. Components and sizes:
      a. 1-1/2" high main tee runners, standard.
      b. 15/16" wide exposed finished face.
      c. Manufacturer's standard angle wall molding. Exposed flange to match size of exposed runners.
      d. All exposed surfaces to match in color and texture.
   4. Exposed tee surface color, finish:
      a. Color to match ceiling panels unless noted otherwise.

C. Anchoring Devices: Provide hot-dip galvanized steel, ASTM A153, Coating Class C and D, screws, bolts, rods, hooks and eyes, and other devices designed for attachment to various types of structural framing systems, including system indicated, for support of ceiling suspension system.
   1. Provide tested and certified carrying and pull-out capacities, for each device, for not less than five (5) times the design load in ASTM C635, Table 1, Direct Hung installations.
   2. Hanger wire and ties:
      a. Galvanized steel wire pursuant to ASTM A641, soft temper, Class 1 coating.
      b. Size hanger wire to carry three (3) times hanger design load pursuant to ASTM C635, Table 1, Direct Hung, but not less than 12 gauge.
      c. Tie Wire: not less than 16 gauge.

2.03 SUPPLEMENTAL MATERIALS

A. Support Channels and Hangers: Galvanized steel, size and type to suit application, seismic requirements, and ceiling system flatness requirements specified.

B. Hold Down Clips for Non-Fire-Resistance-Rated-Ceilings: For interior ceilings composed of acoustical panels weighing less than 1 lb. Per sq. ft., provide hold-down clips spaced 24-inches o.c. on all cross tees.

C. Impact Clips: Provide manufacturer's standard impact clips.

D. Angle Hangers: Angles with legs less than 7/8-inch (22 mm) wide, formed with 0.0396-inch (1 mm) thick galvanized-steel sheet complying with ASTM A446, G 90 ASTM A446M, Z 275 Coating Designation, with bolted connections and 5/16-inch (8 mm) diameter bolts.

E. Edge Moldings and Trim: Where indicated, provide manufacturer’s edge moldings and trim of profile to match ceiling grid system specified.
   1. Baked-Enamel Finish: AA-C12C42R1x - Apply baked enamel according to paint manufacturer’s specifications for cleaning, conversion coating, and applying organic coating.
      a. Organic Coating: Manufacturer’s standard thermosetting coating system with a minimum dry film thickness of 0.8 to 1.2 mil.
      b. Color: White.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine areas to receive materials for conditions which will adversely affect installation. Provide written report of discrepancies with copies to Contractor and Architect.

B. Do not start work until unsatisfactory conditions are corrected or architect issues notice to proceed. Application or installation of materials constitutes acceptance of supporting construction.

C. Work to be concealed: Verify work above ceiling suspension system is complete and installed in manner that will not affect layout and installation of suspension system components.

3.02 PREPARATION

A. Field Dimensions: Verify ceiling layouts by actual field dimensions prior to installation.

B. Acoustical panels must reach room temperature and stabilized moisture content prior to installation.

3.03 INSTALLATION - DIRECT HUNG CEILING SUSPENSION SYSTEM

A. Install pursuant to Manufacturer's installation instructions for Seismic Zone of project, ASTM C636, CISCA current published recommendations, CISCA 0-2 and applicable code requirements in force at time of installation.

B. Install pursuant to manufacturer's published instructions where more stringent than standards specified, or where procedure is not covered by standards.

C. Suspend main beams from overhead construction with hanger wires spaced a maximum of 4’-0” o.c. along the length of the main runner. Install hanger wires plumb and straight.

D. Do not load system so as to produce rotation of runners.

E. Allowable deflection of main runners and cross runners is limited to 1/360 of the span between supports pursuant to ASTM C635.

F. When weight of components supported on main runners and cross runners causes total dead load to exceed deflection capability, provide additional hangers located within 6 in. of each corner of the component, unless otherwise recommended by manufacturer, or support components independently of the suspension system.

G. No. 12 gage hangers shall be attached to the grid members within 3 inches of each corner of each lighting fixture. Tandem fixtures may use common wires. Lighting fixtures must be positively attached to the suspended ceiling system - see Division 26 - Electrical for further information.

H. Support system independent of walls, columns, ducts, pipes, and conduit. When splicing carrying T’s, maintain face plane with adjacent members.

I. Use properly placed and suspended load carrying bracing channels to maintain hanger vertical when interrupted by mechanical ducts and other horizontally run equipment.

J. Attachment to metal roof deck is prohibited.

K. Center suspended ceiling grid on room axis so as to provide equal border units, so arranged that units less than one-half width do not occur unless otherwise shown on Drawings.

L. Install wall molding at intersection of ceiling and vertical surfaces after primer and first coat of finish paint has been applied, using longest practical lengths. Continuously back bed vertical leg of molding with acoustical sealant. Firmly secure moldings to walls with corners neatly mitered or provide corner caps.
   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 over 16-inches o.c. and not more than 3-inches from ends, leveling with ceiling suspension system to a tolerance of 1/8-inch in 12-feet. Miter corners accurately and connect securely.
   3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

M. Where circular or radius penetrations occur, provide preformed closers to match edge moldings.

3.04 INSTALLATION, LAY-IN CEILING PANELS

A. Install acoustical ceiling materials in compliance with manufacturer's specifications and recommendations, including the following:
   1. Fit acoustic units in place, free from damaged edges, soiled surfaces, or other defects detrimental to appearance and function.
   2. Any cut tegular tile must be cut to a matching tegular profile at cut line.
   3. Install acoustic units level, in uniform plane, free from twist, warp, and dents.
   4. Lay directional patterned units one way with pattern parallel to longest room axis, unless otherwise shown on the drawings.
   5. Fit border panels neatly against abutting surfaces.
   6. Reveal edge panels:
      a. Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
      b. Paint cut edges if exposed to view.
   7. Install hold-down clips:
      a. For minimum 4 ft. radius from all doors on both sides of door opening.
      b. For all panels weighing less than 1 lb./sq. ft.
   8. Install impact clips for ceiling areas shown and as specified by manufacturer.

3.05 TOLERANCES

A. Suspension systems shall be installed to meet the minimum requirements established in ASTM C636 standard, and any other requirements established by local code or specified herein.

B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 ADJUSTING, CLEANING AND PROTECTION

A. Upon completion of the Work, remove all unused materials, debris, containers, and equipment from the project site. Clean and repair floors, walls, and other surfaces that have been stained, marred, or otherwise damaged by work under this Section.

B. Replace damaged, broken and/or stained ceiling tiles.

C. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension member. Comply with manufacturer’s instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

D. Protect acoustical ceilings during the construction period so that they will be without any deterioration or damage at the time of acceptance by Owner.

END OF SECTION

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PART 1 GENERAL

1.01 SECTION INCLUDES

A. Decorative Chip System Epoxy floor coating system with a 3/16 inch thick body coat and decorative chip broadcast with integral cove base.

B. Surface preparation.

1.02 REFERENCES

A. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser; 2019.

B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2022.

C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

D. ASTM D3363 - Hardness Testing.

1.03 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.

B. Manufacturer's Installation Instruction: Indicate special procedures and perimeter conditions requiring special attention.

C. Manufacturer’s Safety Data Sheet (SDS) for each product being used.

D. Provide four (4) 3 inch x 3 inch samples of each color chosen demonstrating floor color, texture and thickness and a six inch long cove base sample of the approved product selection.

1.04 QUALITY ASSURANCE

A. The Manufacturer shall have a minimum of Ten (10) years experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.

B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in all phases of surface preparation and application of the product specified.

C. A pre-installation conference shall be held between Applicator, General Contractor, Architect and the Owner's Representative to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

D. Manufacturer of Approved System shall be single source and made in the USA.

E. System shall be in compliance with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.

1.05 DELIVERY, STORAGE AND HANDLING

A. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

B. The Applicator shall be provided with a storage area for all components. The area shall be between 60 F and 90 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.

C. Store materials for three days prior to installation in area of installation to achieve temperature stability.

D. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Owner's Representative or other personnel working with or around the material.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature required by manufacturer three days prior to, during and 24 hours after installation of materials.

1.07 WARRANTY

A. Sherwin-Williams warrants that material shipped to buyers at the time of shipment substantially free from material defects and will perform substantially to Sherwin-Williams published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.

B. Sherwin-Williams' liability with respect to this warranty is strictly limited to the value of material purchase.

1.08 MAINTENANCE DATA

A. Submit maintenance data.

B. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface and suggested schedule for cleaning.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hybri - Flex AC., seamless 3/16" decorative micro-chip epoxy flooring system by Sherwin-Williams High Performance Flooring. Phone: (866) 540-1299.

B. Manufacturer of Approved System shall be single source and made in the USA.

C. Architect approved equivalent.

2.02 MATERIALS

A. Topping: Poly-Crete SL.

1	Percent Solids	100%
2	VOC	0 g/L
3	Bond Strength to Concrete, ASTM D4541	400 psi, substrates fails
4	Compressive Strength, ASTM C 579	9,000 psi
5	Tensile Strength, ASTM D 638	2,175 psi
6	Flexural Strength, ASTM D 790	5,076 psi
7	Impact Resistance @ 125 mil, MIL D-3134, No visible damage or deterioration	160 inch lbs

B. Broadcast and Grout Floor Coating: 100% solids epoxy resin.

1	VOC	3.8 g/L
2	Compressive Strength, ASTM D 695	11,200 psi
3	Tensile Strength, ASTM D 638	2,100 psi
4	Flexural Strength, ASTM D 790	5,100 psi
5	Abrasion Resistance, ASTM D 4060 C-10 Wheel, 1,000 gm load, 1,000 cycles	29 mg loss
6	Flame Spread/NFPA-101, ASTM E 84	Class A
7	Impact Resistance, ASTM D2794	greater than 160
8	Water Absorption. ASTM D570	0.04%
9	Pot life @ 70 F	20 minutes

C. Topcoat - Accelera.

1	Percent Solids	100 %
2	VOC	0 g/L
3	Tensile Strength, ASTM D 638	2,600 psi

4	Compressive Strength, ASTM C-579	18,000 psi
5	Adhesion, ASTM 4541	Substrate Failure
6	Hardness, Shore D ASTM D 2240	70
7	Gloss ASTM D 523 60 Degree	90
8	Abrasion Resistance, ASTM D4060 CS 17 wheel (1,000 g load) 1,000 cycles	27 mg
9	Pot Life, 70 F, 50% RH	7 - 10 minutes

D. Aggregate: Acrylic color chips. Colors and Chip Sizes (Macro and Micro) to be selected by the Architect from the manufacturer's full color offering. Chip size shall be as selected by the Architect.

E. Primer: As recommended by floor covering manufacturer.

F. Patch Materials
   1. Shallow Fill and Patching: Use Dur-A-Flex, Inc. Dur-A-Glaze # 4 Cove-Rez.
   2. Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Flex, Inc. Poly-Crete SL

G. Epoxy Cove Base
   1. 4" high, unless noted otherwise.
   2. Speed Cove™ Precast Cove Base systems or Architect approved equivalent.

2.03 ACCESSORIES

A. Primers and Fillers: Waterproof; types recommended by flooring manufacturer.

B. Expansion Joints/Joint Fillers: Types recommended by flooring manufacturer for specific application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.

B. Verify that surfaces are smooth and flat with maximum variation of 1/4 inch in 10 feet and are ready to receive work.

C. Verify concrete floors have cured a minimum of 28 days, are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization or dusting.

3.02 PREPARATION

A. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.

B. Moisture Testing: Perform tests recommended by manufacturer and as follows.
   1. Perform anhydrous calcium chloride test ASTM F1869. Application will proceed only when the vapor/moisture emission rates from the slab is less than and not higher than 20 lbs/1,000 sf/24 hrs.
   2. Perform relative humidity test using is situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
   3. If the relative humidity exceeds 75% then Dur-A-Flex, Inc Dur-A-Glaze MVP Primer moisture mitigation system must be installed prior to resinous flooring installation. Slab-on grade substrates without a vapor barrier may also require the moisture mitigation system.

C. There shall be no visible moisture present on the surface at the time of application of the system. Compressed oil-free air and/or a light passing of a propane torch may be used to dry the substrate.

D. Mechanical surface preparation
   1. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 3-4as described by the International Concrete Repair Institute.
   2. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
   3. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
   4. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer’s recommendations.

E. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

F. Vacuum clean substrate.

G. Apply primer as per manufacturer's recommendations.

3.03 INSTALLATION FLOORING

A. Apply floor coating system in accordance with manufacturer's instructions. Form integral ¼ inch radius cove base four (4)inches high with same materials as floor coating. Apply four finish coats minimum and spread aggregate uniformly in accordance with the manufacturer's instructions.

B. The system shall be applied in four distinct steps as listed below:
   1. Substrate preparation
   2. Topping/overlay application with colored chip broadcast.
   3. Resin application with colored chip broadcast.
   4. Topcoat application.
      a. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
      b. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
      c. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
      d. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

C. Topping
   1. The topping shall be applied as a self-leveling system as specified by the Architect. the topping shall be applied in one lift with a nominal thickness of 1/8 inch.
   2. The topping shall be comprised of three components, a resin, hardener and filler as supplied by the Manufacturer.
   3. The hardener shall be added to the resin and thoroughly dispersed by suitably approved mechanical means. SL Aggregate shall then be added to the catalyzed mixture and mixed in a manner to achieve a homogenous blend.
   4. The topping shall be applied over horizontal surfaces using 1/2 inch "v" notched squeegee, trowels or other systems approved by the Manufacturer.
   5. Immediately upon placing, the topping shall be degassed with a loop roller.

6. Colored chips shall be broadcast to excess into the wet material, Microchips at the rate of 0.15 lbs/sf.
7. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

D. Broadcast Coat
1. The 2nd broadcast coat shall be applied as specified by the Architect.
2. The broadcast coat shall be comprised of two components, a resin, and hardener as supplied by the Manufacturer and mixed in the ratio of 2 parts resin to 1 part hardener.
3. The resin shall be added to the hardener and thoroughly mixed by suitably approved mechanical means.
4. The broadcast coat shall be applied over horizontal surfaces using squeegee and back rolled at the rate of 100 sf/gal.
5. Colored chips shall be broadcast to excess into the wet material, Microchips at the rate of 0.15 lbs/sf.
6. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

E. Topcoat
1. The grout coat shall be comprised of ACCELERA resin and hardener mixed per the manufacturer's instructions.
2. The grout coat shall be applied using a squeegee and cross rolled with a 3/8 inch nap roller at the rate of 65 sq ft/kit.
3. Apply a second ACCELERA topcoat using a squeegee and cross roll with a 3/8 inch nap roller at the rate of 200 sq ft/kit (for smooth finish).
4. The finished floor will have a nominal thickness of 3/16 inch.

3.04 FIELD QUALITY CONTROL

A. Tests, Inspection
1. The following tests shall be conducted by the Applicator:
a. Temperature
1) Air, substrate temperatures and, if applicable, dew point.
b. Coverage Rates
1) Rates for all layers shall be monitored by checking quantity of material used against the area covered.

3.05 CLEANING AND PROTECTION

A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.

B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

END OF SECTION

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PART 1 GENERAL

1.01 SECTION INCLUDES

A. Epoxy Matrix Wall Finish System

1.02 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026a.

C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2022.

D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

E. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

F. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 013300 - SUBMITTALS, for submittal procedures.

B. Product Data: Provide data indicating matrix materials and physical and performance characteristics.

C. Samples: Submit two samples, 3 inches by 3 inches (76.2mm by 76.2mm) in size illustrating color of matrix, color of aggregate, and clear protective sealcoat.

D. Certificates: Manufacturer's certificate that products meet or exceed specified requirements.

E. Manufacturer's Instructions: Indicate special procedures.

F. Maintenance Data: Include maintenance and cleaning requirements for coatings, stain and graffiti removal, rejuvenation of top coat, repair and patching techniques.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 016100 - BASIC PRODUCT REQUIREMENTS, for additional provisions.
   2. Extra Matrix Material: 1 gallon (4 liters) of each color specified.
   3. Extra Aggregate Material: 5 gallons (20 liters) of each type, size, and color specified.
   4. Label each container with manufacturer's name, product number, color number, and areas where used.

1.04 QUALITY ASSURANCE

A. Products Requiring Flame/Smoke Ratings: ASTM E84 and classified and listed by UL.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three (3) years of documented experience.

C. Applicator Qualifications: Company specializing in performing the work of this section.
   1. Minimum ten (10) years of documented experience listing a minimum of five projects of similar scope accomplished in the last two years.
   2. Approved by manufacturer.

D. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

1.05 MOCK-UP

A. Provide mock-up, 2 feet (0.61 m) long by 4 feet (1.22 m) height minimum or full height of wall, illustrating matrix and aggregate in selected colors.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.06 FIELD CONDITIONS

A. Do not install matrix materials when substrate and ambient temperature is below 50 degrees F (10 degrees C) or above 90 degrees F (32 degrees C) unless permitted otherwise in writing by the manufacturer

B. Substrate temperature must be at least 5 degrees F above the dew point.

C. Material shall not be applied in direct sunlight.

D. Maintain this temperature range, 24 hours before, during, and 48 hours after installation of work.

E. Provide temporary enclosures, heat, and ventilation in areas where work is being performed, to allow work to cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Aggregate Wall Surfacing:
   1. ResuWall Deco Flake by The Sherwin-Willams Company.
   2. Architect approved equivalent.
   3. Substitutions: See Section 016100 - BASIC PRODUCT REQUIREMENTS and Section {\ch\#3}.

2.02 MATERIALS

A. ResuWall Deco Flake
   1. Primer: Resuflor Aqua 3462 at 250-400 sq. ft. per gallon.
   2. Broadcast: 6750D/6755D to excess.
   3. Bonding Coat: Resuflor Aqua 3461 at 250-400 sq. ft. gallon.
   4. Second Broadcast: 6750D/6755D to excess.
   5. Grout Coat: Resuflor Aqua 3461 at 250-400 sq. ft. per gallon.
   6. Seal Coat: Resutile Aqua 4410 at 300-450 sq. ft. per gallon.

B. VOC Content of Resinous Wall and Ceiling Coating: Provide resinous wall and ceiling systems, for use inside the weatherproofing system, that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].
   1. Resinous Flooring: 100 g/L.

2.03 HIGH-PERFORMANCE RESINOUS WALL AND CEILING COATING SYSTEM

A. Resinous Wall and Ceiling Coating: Abrasion-, impact- and chemical-resistant, high-performance, resin-based, monolithic floor surfacing designed to produce a seamless floor.

B. System Characteristics:
   1. Slip Resistance: Provide smooth, orange peel finish unless otherwise specified.
   2. Color and Pattern: As selected by the Architect form the manufacturers full offering of colors and patterns.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work of this section, as instructed by the coating manufacturer. Report all conditions which affect Work. No "waiver of responsibility" for incomplete, inadequate or defective underlaying and adjoining work, surfaces and conditions will

be considered, unless notice of such unsatisfactory conditions has been filed and agreed to in writing before Work begins. Commencement of Work constitutes acceptance of surfaces. Test and report for moisture level in substrate to verify compliance with manufacturer's requirements. Do not proceed unless acceptable test results are achieved.

B. Only installers approved in writing by the manufacturer shall perform installation of the approved material as specified in this section.

C. Verify maximum variation from flat surface of substrate is 1/8 inch (3 mm).

3.02 PREPARATION

A. Inspection: Prior to commencing Work, thoroughly examine all underlying and adjoining work, surfaces and conditions upon which Work is in any way dependent for perfect results. Report all conditions which affect Work. No "waiver of responsibility" for incomplete, inadequate or defective underlaying and adjoining work, surfaces and conditions will be considered, unless notice of such unsatisfactory conditions has been filed and agreed to in writing before Work begins. Commencement of Work constitutes acceptance of surfaces. Clean surfaces of loose foreign matter.

B. Protect adjacent construction from damage and deterioration due to this work.

C. Surface Preparation: Remove all surface contamination, loose or weakly adherent particles, laitance, grease, oil, curing compounds, paint, dust and debris by blast track method or approved mechanical means (acid etch not allowed). If surface is questionable try a test patch. Create a minimum surface profile for the system specified in accordance with the methods described in ICRI No. 03732 to achieve profile numbers as follows:

1. CONCRETE SURFACE PROFILE (CSP)
    a. Thin film, to 10 mils CSP-1 to CSP-3
    b. Thin and medium films, 10 to 40 mils CSP-3 to CSP-5
    c. Self-leveling mortars, to 3/16" CSP-4 to CSP-6
    d. Mortars and laminates, to 1/4" or more CSP-5 to CSP-10

D. Surfaces to receive the bonded polymer system shall be inspected by a manufacturers representative after the surface has been prepared to insure that the substrate is sound and structurally durable. Areas found that do not meet the required surface conditions shall be removed and replaced or re-prepared until acceptable conditions are provided. Do not proceed with the wall system application until surface preparation is found acceptable to the manufacturers representative.

E. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

1. Moisture Testing: Perform tests indicated below.
    a. Calcium Chloride Test: Perform anhydrous calcium chloride test per ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours. Perform tests so that each test area does not exceed 1000 sq. ft. and perform 3 tests for the first 1000 sq. ft. and one additional test for every additional 1000 sq ft.
    b. In-Situ Probe Test: Perform relative-humidity test using in-situ probes per ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative-humidity-level measurement.

F. Surfaces shall be cleaned and vacuumed to provide a clean and dust-free surface.

G. Mask and protect adjacent surfaces and materials not receiving surfacing from material installation; repair all staining or damage to restore original conditions.

H. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through wall system according to manufacturer's written instructions.

3.03 ENVIRONMENTAL CONDITIONS

A. All applicators and all other personnel in the area of the RF installation shall take all required and necessary safety precautions. All manufacturers' installation instructions shall be implicitly instructions shall be implicitly followed.

B. Repair damaged and deteriorated concrete according to resinous wall and ceiling manufacturer's written instructions.

C. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

D. Resinous Materials: Mix components and prepare materials according to resinous wall and ceiling manufacturer's written instructions.

E. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

F. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous wall and ceiling according to manufacturer's written instructions.

3.04 APPLICATIONS

A. Install resinous wall and ceiling coating system over properly prepared concrete surface in strict accordance with the manufacturer's directions.
   1. Install the primer and/or base coats over thoroughly cleaned and prepared concrete.
   2. Install topcoat over wall and ceiling coating system after excess aggregate or sand dust has been removed.
   3. Maintain a slab temperature of 60°F to 80°F for 24 hours minimum before applying wall and ceiling coatings, or as instructed by manufacturer.

B. Apply components of resinous wall and ceiling system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
   1. Coordinate application of components to provide optimum adhesion of resinous wall and ceiling system to substrate, and optimum intercoat adhesion.
   2. Cure resinous wall and ceiling components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
   3. At substrate expansion and isolation joints, comply with resinous wall and ceiling manufacturer's written instructions.

C. Sealant: Saw cut resinous wall and ceiling topping at expansion joints in concrete slab. Fill sawcuts with sealant prior to final seal coat application. Follow manufacturer's written recommendations.

D. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

E. Sand between coats and remove sand dust prior to next coat.

F. Apply topcoats in number indicated for wall and ceiling system and at spreading rates recommended in writing by manufacturer.

3.05 INSTALLATION

A. Consult SDS sheets prior to use of these materials and follow all safety guidelines during the handling, installation and curing operations.

B. Install resinous wall and ceiling coating system over properly prepared concrete surface in strict accordance with the manufacturer's directions.
   1. Install the primer and/or base coats over thoroughly cleaned and prepared concrete.
   2. Install topcoat over wall and ceiling coating system after excess aggregate or sand dust has been removed.

3. Maintain a slab temperature of 60°F to 80°F for 24 hours minimum before applying wall and ceiling coatings, or as instructed by manufacturer.

C. Apply components of resinous wall and ceiling system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
   1. Coordinate application of components to provide optimum adhesion of resinous wall and ceiling system to substrate, and optimum intercoat adhesion.
   2. Cure resinous wall and ceiling components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
   3. At substrate expansion and isolation joints, comply with resinous wall and ceiling manufacturer's written instructions.

D. Wall Surfacing: Mix components, prepare and apply primer, bondcoats with matrix, grout coat and sealcoat in strict accordance with manufacturer's instructions.

E. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

F. Sand between coats and remove sand dust prior to next coat.

G. Apply topcoats in number indicated for wall and ceiling system and at spreading rates recommended in writing by manufacturer.

H. Sealant: Saw cut resinous wall and ceiling topping at expansion joints in concrete slab. Fill sawcuts with sealant prior to final seal coat application. Follow manufacturer’s written recommendations.

I. Allow materials to cure 48 hours before exposure to water and a full seven days to achieve full chemical resistance.

J. Wash any developed surface films with soap and water as recommended by the manufacturer.

3.06 CLEANING

A. Clean surfaces of overspray, splatter, excess material, and staining of adjacent surfaces.

B. Consult manufacturers specifications for cleaning mixing and application equipment being mindful to observe all fire and health precautions when handling cleaning solvents.

C. Upon completion of the Work, clean up and remove from the premises surplus materials, tools, appliances, empty cans, cartons and rubbish resulting from the Work. Clean off all spattering and drippings, and all resulting stains.

3.07 PROTECTION

A. Protection: Protect Work in accordance with manufacturer's directions from damage and wear during the remainder of the construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

B. Contractor shall insure that coating is protected from any traffic until it is fully cured to the satisfaction of the coating manufacturer.

END OF SECTION

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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 Mural Wallpaper.

B. Related Sections include the following:
   1. Section 092116 - Gypsum Board Assemblies.
   2. Section 092123 - Interior Painting.

1.03 REFERENCES

A. Wall covering, Vinyl Coated: Comply with Federal Specification CCC-W-408B.

B. Effect of Household Chemicals on Clear and Pigmented Organic Finishes: ASTM D 1308.

1.04 SUBMITTALS

A. Pursuant to Section 013300 - Submittal Procedures.

B. Pursuant to Section 016100 - Basic Product Requirements.

C. Product Data: Catalog sheets, specifications, and installation instructions for the following:
   1. Wall Mural Wallpaper.
   2. Adhesive, Primer/Sealer.
   3. Metal Molding.

D. Samples:
   1. Mural Wall Covering: 12x12-inch samples of each type, pattern and color specified, with two samples mounted on hardboard backing.
   2. Metal Molding: Two 12-inch-long pieces.

E. Contract Closeout Submittals:
   1. Maintenance Data: Deliver two (2) copies covering the installed products to the Architect.
   2. 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 years.
   1. Furnish to the Architect the names and address of five similar projects which the forgoing people have worked on during the past three years.

B. Fire Hazard Classification: Class "A" as tested and classified by UL in accordance with ASTM E 84 and equal to or less than the following:
   1. Flame Spread: 25
   2. Fuel Contributed: 15
   3. Smoke Developed: 50

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened packages or containers, clearly labeled to identify manufacturer, brand name, quality or grade, and flammability classifications.

B. Store wall covering in a clean and dry area where the temperature is maintained at 40° F minimum.

C. Do not store wall covering in upright position.

1.07 PROJECT CONDITIONS

A. Environmental Requirements: Comply with manufacturer's written recommendations as to environmental conditions under which wall coverings can be applied.

PART 2 PRODUCTS

2.01 WALL MURAL WALLPAPER (ROOM 123 LIBRARY)

A. Wall Mural Wallpaper Manufacturer: Wallsauce.com, Omega Sky LTD., 3 Manor Court, Salesbury Hall Road, Ribchester, Lancashire, UK PR33XR. Phone: (888) 581-7892, www.wallsauce.com.

B. Deluxe Smooth Wall Mural:
   1. Surface: Smooth
   2. Finish: Matte
   3. Weight: 350 gsm
   4. Adhesive: Apply directly to the wall.
   5. Easy to Remove: Yes
   6. Wipe Clean: Yes
   7. Fire Rating: ASTM E84 - 08a, Class A
   8. UV Resistant: Yes
   9. Print/Inks: Printed using environmentally friendly inks.
   10. Environment: FSC Certified

C. Scene:
   1. Two elephants joining their trunks creating a heart shape with the setting sun in the background. Product code: 1076/01229132-1. Verify selection with Owner, CM and Architect prior to order.
   2. Size: 20'x7" wide X 10'x2" high, add 2" extra for trimming. Verify all dimensions in the field.

D. Primer/Sealer:
   1. Primer/Sealer as recommended by mural provider to properly size wall.

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 similar 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.
   3. Gypsum Wallboard: 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 all 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 MURAL WALL COVERING

A. Gypsum wall board to be finished to a level 5 finish in accordance with Section 092116.

B. Install mural wall covering within 30 days of Substantial Completion to minimize the chances for damage.

C. Install in accordance with manufacturer's instructions and recommendations.

D. Mural is to be cut out around door frame(s).

3.04 INSTALLATION OF 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.

3.05 ADJUSTING AND CLEANING

A. Remove excess adhesive from wall covering.

B. After wall covering had dried, reinstall the items which were removed.

C. Upon completion of the Work, remove surplus materials, rubbish and debris resulting from installation of wall covering.

END OF SECTION

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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 surface preparation and the application of paint systems on interior substrates.
   1. Concrete.
   2. Concrete Masonry Units.
   3. Steel.
   4. Galvanized metal.
   5. Gypsum board.
   6. Wood.
   7. Aluminum.

1.03 DEFINITIONS

A. Flat: Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

B. Matte: Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

C. Eggshell: Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

D. Satin: Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

E. Semi-Gloss: Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

F. Gloss: Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

G. High Gloss: Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.
   1. Product List: For each product indicated, include the following:
   2. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   3. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
   4. VOC content.

1.05 CLOSEOUT SUBMITTALS

A. Coating Maintenance manual: 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.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

B. 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.

1.07 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
      a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
      b. Other Items: Architect will designate items or areas required.
   2. Final approval of color selections will be based on mockups.
      a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Remove rags and waste from storage areas daily.

B. 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:
   1. Product name and type (description).
   2. Batch date.
   3. Color number.
   4. VOC content.
   5. Environmental handling requirements.
   6. Surface preparation requirements.
   7. Application instructions.

1.09 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Lead Paint: It is not expected that lead paint will be encountered in the Work. If Lead paint is encountered, refer to OSHA "Lead In Construction Standard". Additional regulations may apply if the project is considered EPA defined Target Housing or Child Occupied Facility.

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. Benjamin Moore & Co.
   2. PPG Architectural Finishes, Inc.
   3. Sherwin-Williams Company.

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. Nonflat Paints and Coatings: 150 g/L.
   3. Dry-Fog Coatings: 400 g/L.
   4. Primers, Sealers, and Undercoaters: 200 g/L.
   5. Anti-corrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
   6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
   7. Pretreatment Wash Primers: 420 g/L.
   8. Floor Coatings: 100 g/L.
   9. Shellacs, Clear: 730 g/L.
   10. Shellacs, Pigmented: 550 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.

2.03 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: MPI #4.
   1. Benjamin Moore - Super Spec - Int/Ext High-Build Block Filler - 206/K206 (75-100 sq. ft. / gal - 4.2 mdf per coat), VOC 55 g/l, CHPS (E3)
   2. Sherwin-Williams - PrepRite Int/Ext Block Filler, B25W25, at 75-125 sq. ft. per gal. (E3)
   3. Or approved equal.

2.04 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.
   1. Benjamin Moore - Ultra Spec 500 Latex Primer N534 (0 g/l), 50 X-Green (E3)
   2. Sherwin-Williams - Pro Mar 200 Zero - Interior Latex Primer - B28W02600/B28WQ2600 (E3)
   3. PPG - Speedhide Interior Latex - Quick-Drying #6-2 (E3)

B. Primer Sealer MPI #60.
   1. Benjamin-Moore - (E3) Insul-X Tough Shield Floor and Patio TS-3 (<200 g/l)
   2. Sherwin-Williams - Protective & Marine - Armorseal Tread-Plex - B90W111 (E3)
   3. Or approved equal.

C. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.

1. Benjamin Moore - Ultra Spec 500 Latex Primer N534 +(0 g/l), MPI 149 X-Green (E3)
2. Sherwin-Williams - ProMar 200 Zero - Interior Latex Primer - B28W02600/B28WQ2600 (E3)
3. PPG - Speehide Zero Interior Zero VOC - #6-4900XI -(E3)

D. Primer, Latex, for Interior Wood: MPI #39.
1. Benjamin Moore - Fresh Start N023 Primer, CHPS Certified (E3)
2. Sherwin-Williams - PrepRite ProBlock Primer Sealer - B51-620 Series, at 4.0 mils wet, 1.4 mils dry. (E3)
3. Or approved equal.

E. Primer, Alkyd, Anti-Corrosive, for Metal: MPI #79.
1. Benjamin Moore - Super Spec Alkyd Metal Primer P06, 1.9 mdf, VOC - 313 (E2)
2. Sherwin-Williams - Protective & Marine - Kem Bond HS - B50WZ4 (E2)
3. Rustoleum - High Performance - 7400 System - #2082402 (E2)
4. Or approved equal

F. Primer, Alkyd, Quick Dry, for Metal: MPI #76.
1. Benjamin Moore -Corotech Universal Metal Primer V131, 2.1 mdf, 333 g/l.
2. Sherwin-Williams - Protective & Marine - Kem Bond HS Universal Alkyd Primer - B50WZ0004 (E3)
3. Or approved equal.

G. Primer, Galvanized, Water Based: MPI #134.
1. Benjamin Moore Super Spec HP Acrylic Metal Primer P04/KP04.
2. Sherwin Williams - Pro Industrial - Pro-Cryl Universal Primer - B66W310 (E2)
3. Or approved equal.

2.05 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1): MPI #53.
1. Benjamin Moore - Eco Spec WB Interior Latex Flat Finish N373/F373 (E3)
2. Sherwin-Williams - Solo - Interior/Exterior 100% Acrylic Flat - A74W00051 (E3)
3. PPG - Speedhide - Interior Flat Latex - #6-70 (E3).
4. Or approved equal.

B. Latex, Interior, (Gloss Level 4): MPI #43 (Pearl / Satin / Low Lustre)
1. Benjamin Moore - Ultra Spec 500 Latex Semi Gloss N539 (0 g/l), 43 X-Green (E3).
2. Sherwin-Williams - ProMar 200 Zero VOC - Interior Latex Semi-Gloss, B31-2600 Series - (E3).
3. Or approved equal.

C. Latex, Interior, Institutional Low Odor/VOC, Flat (Gloss Level 1): MPI #143.
1. Benjamin Moore - Ultra Spec 500 Latex Eggshell N538 (0 g/l), MPI #143 X-Green, CHPS Certified (E3).
2. Sherwin-Williams - Harmony - Interior Acrylic Latex Flat - B05W01051 (E3)
3. Or approved Equal.

D. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3): MPI #145
1. Benjamin Moore - Ultra Spec500 Latex Eggshell N538 (0 g/l), MPI # 145 X-Green, CHPS Certified (E3).
2. Sherwin Williams Promar 200 Zero VOC - Interior Latex Flat - #B30WO2651/B30WQ2651 (E3).
3. PPG Speedhide Zero - Interior Zero VOC Latex Flat - #6-4110XI (E3).

E. Latex, Interior, High Performance Architectural, (Gloss Level 2): MPI #138.
1. Benjamin Moore Regal Select Waterborne Interior Paint - Eggshell Finish 549, 1.5 mdf, (0 g/l), MPI #138 X-Green, CHPS Certified.
2. Sherwin-Williams - SuperPaint - Interior Latex Satin - A87W001151/A87WQ1151 (E3)

3. Or approved equal.

2.06 SOLVENT-BASED PAINTS

A. Epoxy Primer MPI #212
   1. Sherwin-Williams - Protective & Marine - ArmorSeal 33 Epoxy Primer - B58AQ33/B60VQ33 (E3)
   2. Or approved Equal

B. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5): MPI #81.
   1. Corotech Alkyd Enamel Semi-Gloss V231, 2.0 - 2.5 mdf, 389 g/l.
   2. Or approved equal.

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 460 mm (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: Primer sealer, interior, institutional low odor/VOC, MPI #149. Benjamin Moore - Ultra Spec 500 Latex Premier N534 (0 g/l), MPI #50 X-Green (E3)
      b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat
      c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3), MPI #145 X-Green. Benjamin Moore - Ultra spec 500 Latex Egg shell, N 538 (0 g/l).

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: Benjamin Moore - Insl-X Tough Shield Floor and Patio TS-3 (<200 g/l).
   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: Benjamin Moore - Insl-X Tuffcrete Waterborne Acrylic Concrete Stain CST-2xxx, 450-500 sq. ft. / gal., 153 g/l, MPI #58.
      b. Second coat: Benjamin Moore - Insl-X Tuffcrete Waterborne Acrylic Concrete Stain CST-2xxx, 450-500 sq. ft. / gal., 153 g/l, MPI #58.
   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 #212: S-W Armorseal HS Polyurethane, B65W220 Series, at 2.0 to 3.0 mils dry, per coat, with manufacturer's recommended slip-resistant aggregate.

C. CMU Substrates
   1. High-Performance Epoxy Paint System: (MPI INT 4.2G)
      a. Block Filler: Block filler, epoxy, MPI #116: S-W Kem Cati-Coat HS Epoxy Filler/Sealer, at 10 to 20 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, semi-gloss, (Gloss Level 5), MPI #72: S-W Acrolon 218 HS Acrylic Polyurethane, B65-650 Series, at 3.0 to 6.0 mils dry, per coat.
   2. Water-Based Light Industrial Coating System: (MPI INT 4.2K)
      a. Block Filler: Benjamin Moore Super Spec Masonry Int/Ext High Build Block Filler 206, 75-100 sq. ft. /gal., 8.5-11.4 mdf, 45 g/l, MPI#4, CHPS Certified.
      b. Intermediate Coat: Light industrial coating, interior, water-based, matching Topcoat.
      c. Topcoat: Light Industrial coating, interior, water-based, eggshell, (Gloss Level 5), MPI #153 X-Green: Benjamin Moore Ultra Spec HP DTM Acrylic Enamel Semi-Gloss HP29, 2.3 mdf, VOC-45.
   3. Latex System: (MPI INT 4.2A)
      a. Block Filler: Latex Block Filler, MPI #4 X-Green: Benjamin Moore Super spec Masonry Int/Ext High Build Block Filler 206, 75-100 sq. ft. / gal., 8.5-11.4 mdf
      b. Intermediate coat: Latex interior, matching topcoat.
      c. Topcoat: Latex, interior flat (Gloss Level 2), MPI #44 X-Green / #144 X-Green: Benjamin Moore - Ultra Spec 500 Interior Low Sheen Finish N537, 1.8 mdf, (0 g/l), CHPS Certified.

D. Metal Substrates:
   1. Latex System: (MPI INT 5.1Q)
      a. Prime Coat: Primer, rust-inhibitive, water-based, MPI #107: Benjamin Moore Super Spec Acrylic Metal Primer P04, 2.0 mdf, VOC-47, CHPS Certified.
      b. Intermediate Coat: Water-based acrylic interior, matching Topcoat.
      c. Topcoat: Water based acrylic, gloss (Gloss Level 5), MPI #147 X-Green: Benjamin Moore Ultra Spec 500 Interior Gloss finish N540, 1.8 mdf, (0 g/l), CHPS Certified.
   2. Water-Based Dry-Fall System: (MPI INT 5.1C)
      a. Two Top Coats: Dry-fall latex, flat, MPI #118: Benjamin Moore - Coronado Super Kote Flat Latex dry Fall N110, 1.1-1.7 mdf, 375-475 sq. ft. / gal., (46 g/l), CHPS Certified.
   3. Pigmented Polyurethane over Epoxy System: (MPI INT 5.1H)
      a. Prime Coat: Epoxy, high-build, low gloss, MPI #108: Benjamin Moore - Corotech Polyamide Epoxy Semi-Gloss Coating V400, 2.5-3.0 mdf, (326 g/l).
      b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
      c. Topcoat: Polyurethane, two-component, pigmented, semi-gloss, (Gloss Level 5), MPI #72: Benjamin Moore - Corotech, Alphatic Acrylic Urethane Gloss, V500, 2.5-3.6 mdf, (229 g/l).
   4. Epoxy-Modified Latex System: (MPI INT 5.1K)
      a. Prime Coat: Primer, rust-inhibitive, water based, MPI #107: Benjamin Moore - Corotech Acrylic Metal Primer, V110.
      b. Intermediate Coat: Epoxy-modified latex, interior, gloss matching topcoat.

c. Topcoat: Epoxy-modified latex, interior, gloss, (Gloss Level 6), MPI #115: Benjamin Moore - Corotech, Acrylic Epoxy Gloss, V450-90, 1.5 - 2.0 mdf, (168 g/l),

5. Acrylic/Alkyd System:
   a. Prime Coat, MPI #107: Benjamin Moore - Corotech Acrylic Metal Primer, V110,
   b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
   c. Topcoat: Water-based acrylic-alkyd, semi-gloss, interior: Benjamin Moore Advance Waterborne Interior Alkyd Semi-Gloss N793, CHPS Certified.

E. Galvanized-Metal Substrates:
   1. Pigmented Polyurethane System: (MPI INT 5.4C)
      a. Prime Coat, MPI #105: Benjamin Moore - Corotech Acrylic Metal Primer V110, 1.5 - 2.0 mdf, (VOC ,<200)
      b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
      c. Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #105: Benjamin Moore - Corotech Urethane Waterborne Urethane Gloss, V540, 470-530 sq. ft. / gal., 1.6-1.8 mdf, (19 g/l).

F. Aluminum (Not Anodized or Otherwise Coated) Substrates:
   1. Pigmented Polyurethane System:
      a. Prime Coat: Primer, vinyl wash: Benjamin Moore - Corotech Waterborne Bonding Primer, V175, 1.6 mdf, (84 g/l).
      b. Intermediate Coat: Polyurethane, two-component, pigmented, matching topcoat.
      c. Topcoat: Polyurethane, two-component, pigmented, gloss: Benjamin Moore - Corotech Waterborne Urethane Gloss, V540, 470-530 sq. ft. / gal., (19 g/l).

G. Wood Substrates:
   1. Water-Based Light Industrial Coating System:
      a. Prime Coat: Primer sealer, latex, interior, MPI #39: Benjamin Moore - Fresh Start N023 Primer, 1.2 mdf, (44 g/l)(E3)
      b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
      c. Topcoat: Light industrial coating, interior, water based, eggshell, (Gloss Level 3), MPI #151: Benjamin Moore - Corotech Pre-Catalyzed Waterborne Epoxy Eggshell, V342, 1.5-2.0 mdf, (VOC- 72). (E1)

H. Gypsum Board Substrates:
   1. Latex System: (INT 9.2A)
      a. Prime Coat: Primer, latex, interior, MPI #149 X-Green: Benjamin Moore - Ultra Spec 500 Latex Primer, N534 (0 g/l),
      b. Intermediate Coat: Latex, interior, matching topcoat.
      c. Topcoat: Latex, interior, flat (Gloss Level 1), MPI #53 X-Green/#143 X-Green: Benjamin Moore - Ultra Spec 500 Latex Flat N536, (0 g/l), CHPS Certified.
   2. Institutional Low-Odor/VOC Latex System: (MPI INT 9.2M)
      a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149 X- Green. Benjamin Moore - Ultra Spec 500 Latex Primer, N534, (0 g/l).
      b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
      c. Topcoat: Latex, interior, institutional low odor/VOC, flat (Gloss Level 1), MPI #143: Benjamin Moore - Ultra-Spec 500 Latex Flat, N536, (0 g/l), CHPS Certified.
   3. High-Performance Architectural Latex System: (INT 9.2B)
      a. Prime Coat: Primer sealer, latex, interior, MPI #50 X-Green. Benjamin Moore - Ultra Spec 500 Latex Primer, N534, (0 g/l),
      b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
      c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 3), MPI #139: Benjamin Moore Ultra spec 500 Latex Eggshell, N538, (0 g/l), CHPS certified.
   4. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer sealer, latex, interior, MPI #50 X-Green: Benjamin Moore - Ultra Spec 500 Latex Primer, N534, (0 g/l).
b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, eggshell, (Gloss Level 3), MPI #151: Benjamin Moore - Corotech Pre-Catalyzed Waterborne Epoxy Eggshell, v342, 1.5- 2.0 mdf, (VOC-72).

5. Epoxy-Modified Latex System: (MPI INT 9.2F)
   a. Prime Coat: Primer sealer, latex, interior, MPI #50 X-Green:Benjamin Moore - Ultra Spec 500 Latex Primer, N534, (0 g/l).
   b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
   c. Topcoat: Epoxy-modified latex, interior, eggshell, (Gloss Level 3), MPI #115: Benjamin Moore - Corotech Pre-Catalyzed Waterborne Epoxy Eggshell, V342, 1.5 - 2.0 mdf, (VOC-72).

END OF SECTION

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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. Solid-polymer toilet compartments configured as toilet compartment enclosures and urinal screens.
   2. Partition Style:
      a. Floor Anchored / Overhead Braced.

1.03 REFERENCES

A. ASTM A351/A351M - Standard Specification for Castings, Austenitic, for Pressure-Containing Parts; 2024, with Editorial Revision (2025).

B. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings; 2018, with Editorial Revision.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

D. ICC A117.1-2009 - Accessible and Usable Buildings and Facilities; 2009.

E. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.

F. All work of this section shall conform to industry standards and/or manufacturer’s recommendations.

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 toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
   1. Show locations of cutouts for compartment-mounted toilet accessories.
   2. Show locations of reinforcements for compartment-mounted grab bars.
   3. Show locations of centerlines of toilet fixtures.

C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

D. Manufacturer's Warranty: Manufacturer's standard 15 -year limited warranty for panels, doors and stiles against breakage, corrosion, delamination and defects in factory workmanship. Manufacturer's standard 1 year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.

1.05 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of toilet compartment, from manufacturer.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Material Fire Ratings:
   1. National Fire Protection Association - NFPA 286: Pass.

D. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC A117.1 for toilet compartments designated as accessible.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.09 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials:
   1. Panels and pilasters shall be 1" thick solid HDPE resin; water resistant; non-absorbent; self-lubricating surface; covered with protective masking. Color and material - homogeneous throughout.
   2. Fire Rating:
      a. Fire-resistance Rating: NFPA 286.
   3. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.
   4. Stainless Steel Castings: ASTM A351/A351M, Type 304.
   5. Edges: Radius.

2.02 SOLID-POLYMER UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Scranton Products.
   2. Approved Equivalent.

B. Toilet Enclosure Style: Floor Anchored/Overhead Braced.

C. Entrance-Screen Style: Floor Anchored/Overhead Braced.

D. Urinal-Screen Style: Wall Hung. Urinal Screen size(s) shall be as indicated on the drawings.

E. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE)or panel material, not less than 1 inch (25 mm) thick, seamless, with eased edges, <>, and with homogenous color and pattern throughout thickness of material.
   1. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
   2. Color, Texture and Patterns: Colors, Textures and Patterns in each room as selected by Architect from manufacturer's full range.

F. Pilaster Shoes and Sleeves (Caps):
   1. Three Inch high manufacturer's standard design; 18 gauge, Type 304 stainless steel secured to pilaster with stainless steel tamper-resistant Torx head sex bolt.
   2. Three inch high manufacturer's standard design Polymer Color and Pattern: Matching or Contrasting with pilaster, as selected by Architect from manufacturer's full range.

G. Urinal-Screen Post: Manufacturer's standard 1 3/4inch heavy-duty aluminum post with chrome-plated escutcheons and caps.

H. Brackets (Fittings):
   1. Full-Height (Continuous) U-Type
      a. Extruded heavy-duty aluminum 6463-T5 alloy as indicated on the drawings.
      b. Stainless steel, Type 304 as indicated on the drawings.
   2. The brackets are fastened to the pilaster with stainless steel tamper resistant Torx head screws and fastened to the panels with stainless steel tamper resistant Torx head sex bolts.

I. Door Hardware:
   1. Wrap-Around Hinges: Hinges shall be 8 inches (203 mm) and fabricated from heavy-duty extruded aluminum wrap-around hinges through-bolted to pilasters and doors with stainless steel tamper resistant Torx head sex bolts. Hinges operate with field adjustable nylon cams. Cams can be field set in 30, 60 or 90-degree increments.
   2. Latches:
      a. Aluminum Slide Bolt Latch and housing shall be made of heavy-duty extruded aluminum (6463-T5 alloy). The latch housing shall have a bright dip anodized finish, and the slide bolt and button shall have a black anodized finish.
      b. Stainless Steel Slide Bolt Latch and housing shall be made of heavy-duty stainless steel type 304. The latch housing shall have a bright finish, and the slide bolt and button shall have a black anodized finish.
      c. Provide occupancy indicator.
   3. Door strike/keeper shall be made of heavy-duty extruded aluminum (6436-T5 alloy) with a bright dip anodized finish and secured to the pilasters with stainless steel tamper resistant Torx head sex bolts. Bumper shall be made of extruded black vinyl.
      a. Style: 3 inches (76 mm) stainless steel emergency access.
   4. Each door shall be supplied with one coat hook/bumper and door pull made of chrome plated Zamac.
   5. Equip outswing handicapped doors with second door pull and door stop.
   6. Emergency access required by lifting door upwards and allowing latch to disengage.

2.03 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
   1. Material: Clear anodized aluminum.
   2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees. Note: Door hardware shall enable emergency access form the exterior of the toilet stall unit for emergency access purposes.
   3. Latch and Keeper: Manufacturer's standard latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
   4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
   5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors and entrance-screen doors.
   6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, heavy-duty extruded aluminum (6463-T5 alloy) head rail with anti-grip profile and in manufacturer's standard finish shall be fastened to the headrail bracket by a stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.

1. Headrail brackets shall be heavy-duty extruded aluminum with a satin finish and secured to the wall with a stainless steel tamper resistant Torx head screws.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.04 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Door Size and Swings: Unless otherwise indicated, provide 24-inch (610-mm) wide, in-swinging doors for standard toilet compartments and 36-inch (914-mm) wide, out-swinging doors with a minimum 32-inch (813-mm) wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.02 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
   1. Maximum Clearances:
      a. Pilasters and Panels: 3/8 inch (9.5 mm).
      b. Panels and Walls: 1 inch (25 mm).
   2. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.
   3. Finished surfaces shall be cleaned after installation and be left free of imperfections.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.03 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors in closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Replace all damaged products including adjacent finish surfaces before Substantial Completion.

END OF SECTION

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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. Washroom accessories.
   2. Miscellaneous Bathroom Accessories
   3. Underlavatory guards.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:
   1. Construction details and dimensions.
   2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   3. Material and finish descriptions.
   4. Features that will be included for Project.
   5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
   1. Identify locations using room designations indicated.

1.04 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty requirements listed under this section.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals. Manufacturer's service and parts manual shall be provided to the owner upon completion of project.

B. All keyed toilet accessories shall be keyed alike. Six keys shall be provided to the Owner.

1.06 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts, and anchoring devices set into back-up construction as required to prevent delaying the Work.

1.07 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: five (5) years from date of Substantial Completion for Toilet Accessories and Hand Dryer units. Mirror reflective surfaces shall be warranted for a period of fifteen (15) years against silver spoilage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Stainless Steel: ASTM A666/A666M, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated. 65-70% post-recycled content.

B. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 (Z180) hot-dip zinc coating.

C. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

D. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

E. Mirrors: ASTM C1048, Tempered Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.02 WASHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Bradley Corporation
   2. American Specialties, Inc.
   3. Approved Equivalent

B. Toilet Tissue (Roll) Dispensers:
   1. Basis-of-Design Product: Bradley Model 5422 - Partition Mounted.

C. Towel Dispenser :
   1. Basis-of-Design Product: Bradley Model 250-15 - Surface Mounted.

D. Liquid-Soap Dispensers:
   1. Basis-of-Design Product: Bradley Model 6A01-11 - Surface Mounted Foam

E. Grab Bars:
   1. Basis-of-Design Product: Bobrick Model B-6806-Series.
      a. Mounting: Flanges with concealed vandal resistant fasteners.
      b. Material: 18-8, Type 304, 18 gauge stainless steel, 0.05 inch thick.
      c. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant, satin-finish texture in grip area.
      d. Outside Diameter: 1-1/2 inches (38 mm).
      e. Configurations and Lengths: As indicated on Drawings. Bar ends are heliarc welded to concealed mounting flanges shall be 1/8 inch thick 18-8 Type 304, 11 gauge stainless steel plate, 2 inches x 3-1/8 inches, and equipped with two screw holes for attachment to wall. Intermediate Flanges are 18-8, Type 304, 22 gauge, 2 5/8 inches x 3 1/8 inches wide by 3 1/8 inches in diameter. Flange covers shall be 22 gauge, 3-1/4 inches diameter x 1/2 inch deep drawn stainless steel with satin finish, and shall snap over mounting flange to conceal mounting screws and/or WingIt (TM) fasteners as required by wall construction. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Clearance between the grab bar and wall shall be 1-1/2 inches.
      f. Grab bars shall comply with barrier-free accessibility guidelines (including ADAAG and ICC A117.1) for structural strength and configurations.

F. Mirror Units:
   1. Basis-of-Design Product: Bradley Model 781-1830

G. Tilt Mirror Units :
   1. Basis-of-Design Product: Bradley Model 740-018300

2.03 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Truebro by IPS Corporation.
   2. Or Architect approved equivalent.

B. Underlavatory Guards Supplied by Plumbing Contractor - Installed by General Contractor):<>
   1. Basis-of-Design Product: TrueBro Lav-Shield.

a. Description: Durable single piece enclosure conceals piping and valves under the lavatory, preventing direct contact with and burns from piping. Removable to allow service access.
b. Material and Finish: Antimicrobial, molded plastic, white.

2.04 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to the Owner's Construction Representative with a transmittal copy to the Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F446.

3.02 TOLERANCES

A. Maximum Variation from Position: 1/8 inch (3 mm).

B. Maximum Variation from Level: 1/16 inch (1.5 mm) over length of unit.

C. Maximum Variation from Plumb: 1/16 inch (1.5 mm) over height of unit.

3.03 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

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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. Vanity aprons and end panels.
   2. Countertop Support Brackets.

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 123661 - Quartz Surfacing Countertops.
   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.

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. Submit pursuant to Section 013300 - Submittal Procedures.

B. Submit pursuant to Section 016100 - Basic Product Requirements.

C. Product Data: Submit manufacturer's technical product data indicating materials, hardware, and finishes used in fabrication of cabinets, as required to show compliance with specifications.

D. 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. Shop Drawings must be based on actual field measurements including field measurements of all utility's sizes and locations.
   2. Casework Shop Drawings shall include coordination for both new and existing utilities. Any required holes in rear or side panels should receive satin chrome escutcheon plates.
   3. Show any modifications required in casework to accommodate all utilities.

E. Installation Instructions: Submit manufacturer's written installation instructions where available. Install fabricated items in accordance with Architect approved shop drawings.

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 weather tight. 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 Laminate Manufacturers:
   1. Formica
   2. Nevamar
   3. Wilsonart
   4. Architect approved equivalent.

B. Plastic Laminates:
   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.

C. Particle Board (If required)
   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. 3/4" Grade A Plywood, u.n.o.
   2. Thickness: As shown on Contract Drawings or as required to produce the finish product shown on Contract Drawings.

E. Hardwood
   1. 1" minimum thickness maple.

2.02 METAL SHELF BRACKETS AND SUPPORTS

A. Countertop Bracket Manufacturers:

1. A & M Hardware, Inc., 400 W. Gramby Street, Manheim, PA 17545, Phone (888) 647-0200 (Basis of Specification).
2. Richelieu, www.richelieu.com; Phone (800) 619-5446.
3. Architect approved equivalent.

2.03 COMPONENTS

A. Wall Cabinets
1. Bottoms, Side Panels and Backs: 3/4” Grade A Plywood with high pressure laminate on all surfaces exposed to view.
2. Doors: 3/4” Grade A Plywood with high pressure laminate on all surfaces, unless noted otherwise.
3. Doors over 4'-0" in height: 1" minimum thickness hardwood maple with plastic laminate finish on all surfaces.
4. Doors with glass: Provide glazing as specified in Section 088000.
5. Unexposed Sides and Tops: 3/4” Grade A Plywood with high pressure laminate. 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.

B. Drawers
1. Boxes: Constructed of 1/2” pre-finished birch hardwood 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” pre-finished birch hardwood (trapped in grooves at all four sides).
3. Horizontal Frame Rails (If applicable): Between drawers to be 3/4” x 3 1/2” Grade A Plywood with high pressure plastic laminate all exposed sides.

C. Shelves
1. Adjustable Shelves Less than 32” in length: 3/4” Grade A Plywood with plastic laminate finish; leading edge of shelf to be finished with high pressure laminate.
2. Adjustable Shelves Greater than 32” in length: 3/4” Grade A Plywood with plastic laminate finish with 2” x 3/4” apron at front edge; leading edge of shelf to be finished with high pressure laminate.

D. Base Cabinets
1. Tops, Bottoms, Side Panels and Backs: 3/4” Grade A Plywood with plastic laminate finish. Finish interior with high pressure laminate.
    a. Reinforce interior top edges of base cabinet front, side, and rear panels to provide additional support area and attachment area for countertops.
2. Doors and Drawer Faces: 3/4” Grade A plywood with plastic laminate finish. Interior with high pressure laminate.
3. Kick Bases: Fabricated with 3/4” white melamine balanced material (to receive base by GC).

E. Countertops (Work Surfaces) (only if specifically called out on Contract Drawings)
1. Plastic Laminate Counters: Fabricated with Grade A Plywood thickness as shown (build down to 1½” thickness) and (GP-50) plastic laminate edge banding, top surface and backsplash; all tops to have white melamine laminated backer sheet at underside.
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.
3. Where counter tops are not supported by base cabinets, provide 1-1/2" x 1-1/2" x 1/4" (unless noted otherwise) aluminum ledger angle continuous along wall.
4. Where counter tops terminate unsupported by a base cabinet or end panel, provide countertop support bracket.

2.04 HARDWARE

A. Hinges: Blum, 110-degree, self-closing, full overlay.
   1. Provide two (2) hinges on doors up to 3'-6" in height.
   2. Provide three (3) hinges on doors 3'-7" to 4'-6" in height.
   3. Provide four (4) hinges on doors 4'-7" to 7'-0" in height.

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.

D. System Screws: Blum 5mm x 10mm zinc plated (Blum #661.1000) attached to drawer box with: flat head zinc screws #6 x ½" (Blum #6062).

E. Cabinet Handles:
   1. 3½" clear anodized satin-finished aluminum bent pulls (Hafele #116.39.446).
   2. Semi-recessed pull handle: Hafele 151.00.311 inset handle.

F. Shelf Support System: Polished galvanized 5mm seismic shelf supports.

G. Door and Drawer Face Bumpers: Blum 4mm x 1.5mm resilient plastic bumper (Blum ETP1950).

H. Escutcheons:
   1. Chrome Plated Steel, low profile escutcheon plates, sized to penetrating pipe or conduit. Overall size must conceal drilled hole in casework.

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 woodwork) 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.

3.05 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

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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 is not limited to, quartz surfacing the following:
   1. Lavatory countertops including sinks if they are integral, backsplashes, side splashes and aprons.
   2. Casework countertops unless noted otherwise.
   3. Work surface countertops unless noted otherwise.
   4. Other countertops as shown on Contract Drawings.
   5. Quartz Countertop Accessories including but not limited to ledger angles, shelf type brackets, concealed countertop brackets.

1.03 STANDARDS

A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.

B. ANSI/NSF 51 – "Food Equipment Materials".

C. ASTM C97 – "Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone".

D. ASTM C99 – "Standard Test Method for Modulus of Rupture of Dimension Stone".

E. ASTM C170 – "Standard Test Method for Compressive Strength of Dimension Stone".

F. ASTM C482 – "Test Method for Bond Strength of Ceramic Tile to Portland Cement Paste".

G. ASTM C484 – "Standard Test Method for Thermal Shock Resistance of Glazed Ceramic Tile".

H. ASTM C531 – "Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes".

I. ASTM C650 – "Standard Test Method for Resistance of Ceramic Tile to Chemical Substances".

J. ASTM E84 – "Standard Test Method for Surface Burning Characteristics of Building Materials".

1.04 SUBMITTALS

A. Pursuant to Section 013300 - Submittal Procedures.

B. Pursuant to Section 016100 - Basic Product Requirements.

C. Manufacturer certifications:
   1. Signed by manufacturer certifying that they comply with the following requirements:
      a. NSF/ANSI Standard 51: Food Contact
      b. UL 723 (ASTM E84): Surface Burning Characteristics

D. Product Data:
   1. Submit the following:
      a. Product specification sheet(s).
      b. Manufacturer's written installation instructions.
      c. Manufacturer's warranty.

E. Shop Drawings:
   1. Show location of each item; provide complete detailed and dimensioned plans and elevations, large-scale details, attachment devices and other components.
      a. Show the following:

1) Full-size details, edge details, attachments, backsplashes, side splashes, aprons, etc.
2) Locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
3) Fabrication details for brackets or manufacturer's bracket product data sheet(s).
4) Details of anchorage to cabinets and to walls.
5) Locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in quartz surface.
6) Locations and sizes of cutouts for sink installation and lavatory installation.
7) Type of sealant.
8) Type of adhesive.
9) Seam locations.
10) Show direction of directional pattern, if any.

F. Samples:
1. 2” x 2” sample for each of Manufacturer’s full line of colors, pattern, and finishes for initial selection.
2. Two (2) 6" x 6" samples of each color selected.
3. Two (2) 4” long samples of selected edging.

G. Maintenance Data:
1. Submit manufacturer’s care and maintenance data, including repair and cleaning instructions.
2. Include in project closeout documents.

1.05 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications:
1. Work of this Section shall be performed by a fabricator/installer approved by the quartz surfacing manufacturer.
2. Use of digital templating equipment and slab layout technology prior to fabrication and installation of all products.
a. Slabsmith.
3. Minimum of five (5) years of documented experience with commercial fabrication/installation of quartz surfaces.

B. Applicable Standards:
1. Standards of the following, as referenced herein:
a. American National Standards Institute (ANSI)
b. American Society for Testing and Materials (ASTM)
c. NSF International
2. Fire test response characteristics:
a. Provide with the following Class A (Class 1) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
1) Flame Spread Index: 25 or less
2) Smoke Developed Index: 450 or less

C. Verify all dimensions in field.

D. Allowable Tolerances:
1. +/- 1/8” in component size over a 10 foot length.
2. +/- 1/8” in location of openings from indicated location.
3. Minimum of 1/16 inch and a maximum of 1/8 inch clearance between quartz surfaces and each wall.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Pursuant to manufacturers published instructions.

B. Protect countertops during transit, delivery, storage and handling to prevent moisture exposure, damage, soiling and deterioration.

C. Store components indoors in clean and dry area prior to installation.

D. Do not deliver until painting, wet work, grinding and similar operations, which could be performed before installation of casework, have been completed in installation areas.

1.07 WARRANTY

A. Provide manufacturer's minimum 10-year warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials. Warranty shall begin at date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:
   1. Silestone by Cosentino SA, Apdo No. 1 Macael 04867, Almeria, Spain. (Basis of Physical Characteristics)
   2. Cambria USA, 11000 West 78th Street, Suite 220, Eden Prairie, MN 55344 Phone: 866-226-2742.
   3. Corian® Design, Corian® Quartz (formerly known as Zodiaq®), Chestnut Run Plaza, 974 Centre Road, P.O. Box 2915, Wilmington, DE 19805, Phone: 800-426-7426.
   4. Architect approved equivalent.

2.02 COUNTERTOP MATERIALS

A. Engineered Stone Countertops
   1. Composition: Quartz aggregate, resin, and color pigments formed into flat slabs.
   2. Physical Characteristics:
      a. Water absorption: Maximum 0.04 percent, tested per ASTM C 97
      b. Bond strength: Average of 211 PSI (1.4 MPa), tested per ASTM C482
      c. Modulus of rupture: Average of 6200 PSI (5.11 MPa), tested per ASTM C99
      d. Flexural strength: 5620 PSI (50.3 MPa), tested per ASTM C 880
      e. Abrasion index: Minimum 62, tested per ASTM C 241
      f. Thermal shock: Pass 5 cycles, tested per ASTM C 484
      g. Thermal expansion: 1.747 x 10-5, tested per ASTM C 531
      h. Flame spread: Class 1 (FS-25 or less), tested per ASTM E84
      i. Mohs hardness: 6 to 6.5
      j. Stain resistance: Stains completely removed, tested per ASTM C 650, excluding hydroxide.
   3. Thickness: 1-1/4" (3 cm).
   4. Edge detail: Bullnose (Full Bullnose or Volcanic Edge).
   5. Color: To be selected from manufacturer's colors in ALL price groups.
   6. Surface finish: Polished.
   7. Provide ¾" x 4" backsplash with profiled edges on all countertops unless noted otherwise. Provide ¾" x 4" side splashes with profiled edges where shown on the Contract Drawings.

2.03 SETTING MATERIALS

A. Adhesive: 50-year, 100% silicone or epoxy adhesive approved by quartz surfacing manufacturer.

B. Adhesive which is visible in finished work shall be tinted to match quartz surface.

2.04 ACCESSORIES

A. Epoxy Adhesive: K-bond epoxy type provided by countertop manufacturer.

B. Joint Sealant: Single component silicone sanitary sealant and backing materials; specified in Section 079200 - Sealants.

C. Vanity Counter Center Support Bracket: A & M Hardware, Inc., standard workstation and countertop bracket or Architect approved equivalent, 1/4" x 18" x 18" aluminum, color as selected by Architect.

D. Countertop and vanity top rear and side (at fixed wall) ledger angles: 1/4" x 2" x 2" aluminum angle.

2.05 FABRICATION

A. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer’s printed instructions and technical bulletins.

B. Utilize digital images for seam coordination, product flow, and bookmatch material.

C. Form joints between components using manufacturer’s standard joint adhesive.
   1. Reinforce as required.
   2. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
   3. Rout and finish component edges with clean, sharp returns.
   4. Rout cutouts, radii and contours to template.

D. Smooth edges.

PART 3 EXECUTION

3.01 JOB CONDITIONS

A. Conditioning: Comply with manufacturer's recommendations for temperature and humidity requirements in installation areas. Do not install countertops until required temperature and relative humidity have been stabilized and will be maintained in installed areas.

B. Do not install countertops until walls and ceilings of the spaces to receive the Work have been finished.

3.02 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 in accordance with manufacturer’s instructions.

C. Provide factory cutouts for plumbing fittings and accessories.

D. Provide surfaces with a uniform finish.

E. Install countertop plumb, level, true and straight with no distortions. Shim as required using concealed shims.
   1. Tops:
      a. Flat and true to within 1/8 inch of a flat surface over a 10-foot length.
      b. Allow a minimum of 1/16 inch to a maximum of 1/8 inch clearance between surface and each wall.
      c. Form field joints using manufacturer’s recommended adhesive, with joint widths no greater than 1/16 inch in finished work.
      d. Keep components and hands clean when making joints.

F. Where countertop abuts other finished work, scribe and cut for accurate fit.

G. 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, and soap dispenser.

H. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Reinforce joints as required.

I. Adhere sinks to tops using manufacturer's recommended sealant, adhesive and mounting hardware.

J. Anchor countertop securely in place with concealed fasteners and adhesives as recommended by manufacturer.

K. Provide backsplashes and side splashes as indicated on the Contract Drawings.
   1. Adhere to countertops using silicone sealant.

L. Where quartz surfacing vanity top abuts a toilet partition or urinal screen, provide a vanity counter support bracket or plastic laminate end support panel. Do not attach countertop to toilet partition or urinal screen.

M. Secure support brackets and ledger angles to solid, fire-retardant wood blocking concealed within the stud wall cavity.
   1. Provide solid wood, fire-retardant blocking vertically along full width of metal wall studs to secure concealed shelf support brackets. Provide wall stud with wood blocking at each concealed shelf support location.

3.03 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as directed upon completion of installation.

B. Do NOT allow harsh chemicals, such as lacquer thinner, turpentine, nail polish remover (acetone) or stove and drain cleaners, to REMAIN in contact with the surface. Hot pans and heat-producing appliances should be placed on heat shields or hot pads.

C. Clean exposed and semi-exposed surfaces, touch-up as required. Remove and refinish damaged or soiled areas.

D. Apply heavy kraft paper or other heavy protective coating masked in place to prevent surface damage. Remove kraft paper at building turn over to Owner and clean countertops.

END OF SECTION

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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. Coordination
   2. Interpretation of Plans
   3. Coordination Drawings.
   4. Cost Breakdown
   5. Substitutions and Prior Approval Requests
   6. Record Documents
   7. Maintenance Manuals
   8. Fire Safety Precautions
   9. Personal Safety Requirements
   10. Testing, Adjusting and Balancing
   11. Equipment Rebates
   12. Temporary Equipment Operation
   13. Piping materials and installation instructions common to most piping systems.
   14. Equipment installation requirements common to equipment sections.
   15. Painting and finishing.
   16. Concrete bases.
   17. Supports and anchorages.

1.03 GENERAL

A. This Section includes mechanical items common to all of this division specification sections.

B. Provide services, skilled and common labor, and all apparatus and materials required for the complete installation as shown and within the intent of the contract documents, field conditions, and code requirements.

C. The intention of these Contract Documents is to call for finished work, fully tested and ready for operation. Any components or labor not mentioned in the Contract Documents but required for functioning systems shall be provided. Should there appear to be any discrepancies or questions of intent, the Contractor shall refer the matter to the Architect/Engineer for decision before start of any related work.

D. The drawings show the general arrangement of systems and equipment but do not show all required fittings and offsets that may be necessary to connect pipes and ductwork to equipment, and to coordinate with other trades. Provide all necessary fittings, offsets and runs based on field measurements and at no additional cost. Coordinate with other trades for space available and relative location of equipment and accessories. Pipe and duct location on the drawings shall be altered by contractor where necessary to avoid interferences and clearance difficulties.

1.04 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:
   1. ABS: Acrylonitrile-butadiene-styrene plastic.
   2. CPVC: Chlorinated polyvinyl chloride plastic.
   3. PE: Polyethylene plastic.
   4. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:
   1. EPDM: Ethylene-propylene-diene terpolymer rubber.
   2. NBR: Acrylonitrile-butadiene rubber.

1.05 WARRANTY

A. Provide guarantee and maintain the stability of workmanship and materials used and keep same in good operating condition for a period of minimum or one year after final completion of the work (unless specified otherwise) as evidenced by the issuance of the final certificate by the Architect.

B. Correct any deficiencies/defects of any kind immediately and; at the Contractors expense due to faulty workmanship or materials that arise during the above mentioned period of time. Corrections shall be done to the satisfaction of the Engineer/Architect. Such reconstruction and/or repairs shall include damages to the finishes or the building resulting from the original defect.

1.06 COORDINATION

A. Coordinate mechanical work with that of other trades in order to:
   1. Avoid interferences between general construction, mechanical, electrical, structural and other specialty trades.
   2. Maintain clearances and advise other trades of clearance requirements for operation, repair, removal and testing of mechanical equipment.
   3. Indicate aisle-ways and access-ways required on coordinated shop drawings for roof equipment area, mechanical equipment rooms, data and telecomm rooms, corridors, ceiling spaces, shafts, corridors, ceiling space, laboratories, etc.

B. Understanding of Work:
   1. Study, examine, and compare of the contract documents, including drawings and specifications. The Subcontractor shall have a full understanding of how the work in this part is scheduled, phased, and installed with work of other trades.
   2. Include in this installation piping, ductwork, devices, and equipment that are necessary for complete and operating systems as specified and as required.
   3. Connect piping and ductwork from fixtures, outlets, and devices full size to the nearest suitable main or riser.
   4. Certain installations may be presented as typical, and full details are not repeated for each case. Subcontractor shall provide complete installation as if full details apply to each and every case, and make adjustments to typical details to suit each specific installation as part of the basic work.
   5. Installation of work presented on the diagrams are applicable to the plans, and work depicted on the plans are applicable to the diagrams.
   6. If there is a discrepancy in the drawings or specifications, the contractor shall figure the work based on the most stringent requirements to complete the installation and obtain clarification from the Architect before installation.

C. Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.
2. Verify dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in- place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible. Work shall be above ceilings or ceiling line.
7. Coordinate installation and connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Coordinate with individual system requirements.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as is practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
12. Coordinate with the locations of electrical panels and avoid installing piping and ductwork over them. Electrical panels are purposely located and have priority for location. The contractor is responsible for required piping and ductwork offsets to insure that the panels are located as designed and for other conditions.
13. Perform system modification recommended by Test and Balance Agency after recommendations are accepted by the Engineer

1.07 INTERPRETATION OF PLANS

A. In general, the Drawings are to scale. However, to determine exact locations of walls and partitions, the Contractor shall consult the architectural and/or structural Drawings which are dimensioned. Drawings shall not take precedence over field measurements.

B. Drawings are diagrammatic only. They are intended to indicate size and/or capacity where stipulated, approximate location and/or direction, and approximate general arrangement of one phase of work to another, but not the exact detail of construction. All work shall be constructed from field measurements taken at the site. This shall include all rises, drops, elbows, offsets, etc as necessary to avoid structural members or equipment and materials installed by other trades. The contractor shall coordinate the ductwork and piping layout before construction. No additional costs will be allowed for piping and ductwork fabrications without field verification of available space. If it is found, before installation, that a more convenient, suitable or workable arrangement of any or all phases of construction would result by altering the arrangement indicated on the Drawings, the architect/engineer may require the contractor to change the arrangement of his work without additional cost to the owner.

C. The drawings and specifications are intended to supplement each other. Any items shown on the drawings and not mentioned in the specifications, or vice versa, shall be executed the same as if mentioned and shown.

D. The greatest quantity or more expensive work shall govern where there is a conflict noted anywhere on the drawings and/or specifications.

1.08 COORDINATION DRAWINGS

A. Review contract documents and prepare coordination model drawings as an informational supplemental submittal in accordance with Division 1, 21, 22, and 23 requirements. Provide drawings of all areas of the project. Architectural models of the building will be made available upon request. Detailed mechanical models will not be made available. Facilitate coordination meetings and revise drawings as required to resolve work conflicts.

B. All contractors (including steel, precast concrete, fire protection, lighting, plumbing, piping, and building sound systems) are required to attend a minimum of (3) three coordination meetings on site to resolve any coordination issues prior to start of construction.

C. If the coordination drawings are not complete and/or coordinated prior to the work being started no extra cost shall be incurred by the owner due to coordination issue and it shall be the responsibility of the contractors to make the necessary modifications to the system to meet the requirements. All modifications shall be approved by the engineer/architect but at the cost to the contractor.

D. The composite model drawings of all trades shall detail all structural building elements, mechanical equipment, and work of other trades. Indicate locations where space is limited for installation, access for service, and where sequencing and coordination of installations are of importance to the efficient flow of work. The composite drawings shall include at a minimum the following. Where required for clarity multiple composite drawings may have to be submitted for each area.
   1. Clearances for maintaining ceiling heights.
   2. Clearances for installation of material and equipment for all trades.
   3. Clearances for installing and maintaining insulation.
   4. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
   5. Equipment connections and support details.
   6. Penetrations thru block walls and Pre-cast walls.
   7. Exterior wall and foundation penetrations.
   8. Fire-rated wall and floor penetrations.
   9. Sizes and locations of required concrete pads and bases.
   10. Valve stem movement.
   11. Dimensional locations of pipe sleeves passing through floor/roof slabs.
   12. Locations of wall and ceiling access panels where required for access to mechanical equipment.
   13. Reflected ceiling plans to integrate installations of light fixtures, grilles, registers, and diffusers, sprinklers, communication systems, and other ceiling mounted components.
   14. Both new and existing structural elements.

1.09 COST BREAKDOWN

A. Submit a cost breakdown for each claim according to General Conditions of the Contract. Include project name, location, Architect/Engineer, Contractor and date.
   1. List the cost breakdown for labor and material separately and include a total.
   2. Breakout and detail the cost according to specification sections.

1.10 SUBSTITUTIONS AND PRIOR APPROVAL REQUESTS

A. Equipment manufacturers where indicated on the drawings are the basis of design. The contractor accepts responsibility for all design implications when providing approved equipment other than the design basis.

B. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics than the basis of design may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at the cost of the contractor. If minimum energy rating or efficiencies are specified, equipment shall comply with those requirements. Cost implications to other trades are the responsibility of the contractor.

C. Dimensional and Wight Changes: Substituted equipment with dimensions or weight different than the basis of design may be furnished provided such proposed equipment is approved in writing. The contractor is responsible for verifying and coordinating proposed equipment such that it maintains the design intent for access and serviceability and reserves space for future equipment where required. Cost implications to other trades are the responsibility of the contractor.

D. Bids shall be based on the exact materials specified, those listed scheduled on the drawings, or on materials which have been accepted as equivalent. The specified/scheduled products have been used in the design of the project and the preparation of the drawings and specifications as such establish minimum standards of function, dimension, appearance and quality necessary and requisite for this project, which substitutes must meet to be considered acceptable. The burden of proof of equality rests with the party making the request.

E. Requests for substitution shall be in writing and shall be received by the Engineer not later than 10 days before bid opening date. Materials not specified or accepted as equivalent shall not be acceptable for installation.

F. Each prior approval request for substitution shall include and meet the following requirements:
   1. The name and model of the material or equipment for which an equivalent is being proposed and a complete description of the proposed equivalent including drawings, cuts sheets, equipment performance capacity and test data, equipment weights, electrical and any other information necessary for a complete evaluation.
   2. A written comparison listing any deviations from the scheduled equipment and/or the specification requirements must also be provided prior to any proposed substitution will be evaluated.
   3. A written statement setting forth any changes in other materials, equipment, electrical, structural and/or other Work in which incorporation of the equivalent may be required shall be included.
   4. Material and/or equipment requests which do not meet the above requirements will not be evaluated or approved.
   5. The burden of proof of the merit of the proposed equivalent is upon the proposer. Any and all extra costs associated with the equipment change and affecting architectural, structural, mechanical, plumbing or electrical work shall be responsibility of the entity requesting the substitution.
   6. The Engineer’s decision of approval or disapproval of a proposed equivalent is final.

G. Final approval of all equipment shall be contingent on shop drawing acceptance, compliance with the specifications and performance criteria as scheduled and acceptable installation. General approval to bid a product does not relieve the Supplier or Contractor of meeting specific specification requirements.

H. The Mechanical Contractor shall pay, provide, install and be responsible for extra materials required or any other trade due to this use of alternate accepted equipment which has installation requirements different than the specified equipment. The Mechanical Contractor shall pay other trades for any extra work they are involved in due to this substitution of equipment.

I. If substitutions of controls or equipment require any changes in the architectural, structural, mechanical, plumbing or electrical work from that shown on the drawings, the extra cost of the equipment or architectural, structural, mechanical, plumbing or electrical work shall be responsibility of the Contractor requesting the substitution. All substitutions shall be prior approved by the Architect or Engineer before purchase by the contractor.

J. Where any redesign of electrical, mechanical or other work is required due to substitution, arrangement or equipment layout other than herein specified or shown:
   1. Arrange for required redesign by Architect and Engineer.
   2. Pay all costs for such redesign.

1.11 SUBMITTALS

A. Refer to individual product and equipment specification sections for detailed submittal requirements.

B. The mechanical and electrical contractor shall have an onsite meeting prior to installation to review all shop drawings and verify all electrical requirements with the electrical contractor. The mechanical contractor shall be responsible for coordinating and setting up meeting and sharing of mechanical equipment electrical requirements with electrical contractor prior to when construction is set to begin and equipment is to be ordered.

C. The electrical contractor shall sign off on all mechanical shop drawings for electrical requirements prior to ordering equipment.

1.12 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1 Section "Project Record Documents." In addition to the requirements specified in Division 1, at a minimum the contractors shall:
   1. Maintain an on-site set of drawings to record actual revisions to the work being performed on site. Revisions shall be shown on the documents legibly to reflect actual on-site changes to the documents.
   2. Revisions shall be show on the documents in a contrasting color (red).
   3. Revisions shall be updated to the on-site plan daily.
   4. Ensure all revisions and documentation is complete and accurate, enabling future reference by Owner.

B. Refer to specific sections for additional record documentation.

1.13 MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 1 Section "Operating, Maintenance, and Warranty Data". Submit copies for review by Architect/Engineer. In addition to the requirements specified in Division 1, include the following information:
   1. Descriptive summary of function, normal system operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing instructions and lubrication charts and schedules.
   5. Warranty information for all mechanical items shall be included in one tabbed section.

1.14 FIRE SAFETY PRECAUTIONS

A. The Contractors shall exercise extreme care to maintain and exercise adequate fire safety precautions throughout the work. This shall include providing sufficient fire fighting devices,

1. watchmen, standby helpers or other precautions during construction, in use of temporary heat, welding, brazing, sweating, testing or other phases of work.

B. At all times, access shall be maintained for fire department trucks to the building.

C. All welding brazing, cutting and sweating operations performed in vicinity of or accessible to combustible materials shall be adequately protected to make certain that sparks or hot slag does not reach the combustible material and start a fire.

D. All glass, glazed materials and other finish, in the vicinity of welding, brazing and cutting, shall be masked by the Contractor performing the welding work.

E. When necessary to do cutting, welding, brazing, sweating and similar work in vicinity of wood, in shafts, or vicinity of any combustible material (and the combustible material cannot be removed), the materials shall be adequately protected with fire resistant blankets or similar approved coverings. In addition, a helper shall be stationed nearby with proper fire extinguishers (provided by the Contractor performing the work) to guard against sparks and fire.

F. Whenever combustible materials have been exposed to sparks, molten metal, hot slag or splatter, a person shall be kept at the place of work to make sure the smoldering fires have not been started. Whenever cutting or welding operations are carried on in a vertical pipe shaft, a person to act as a fireguard shall be employed to examine all floors below the point of cutting or welding. This fireguard shall be kept on duty after completion of work to guard against fires and shall examine each level after this time, prior to leaving. There shall be no exceptions to this requirement and failure to comply will be construed as negligence.

1.15 EQUIPMENT REBATES

A. The contractor shall be responsible for applying for and leading the rebate application process for all eligible equipment / systems within the project on behalf of the owner.

B. The contractor shall provide all receipts, invoicing, counts, site data, etc as required to procure equipment rebates

C. The contractor shall forward the filled out application and all necessary rebate “back-up” requirements to the owner at the completion of the project.

1.16 PERSONAL SAFETY REQUIREMENTS

A. A. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions required in connection with his work, including regulations of the Occupational Safety and Health Administration (OSHA) and other governing agencies.

1.17 TESTING, ADJUSTING AND BALANCING

A. All domestic hot water circulation systems will be balanced by an independent test and balance agency hired by the mechanical contractor. The scope of the testing and balancing work includes functional performance testing of all mechanical systems. Deficiency reports will be distributed directly to the contractor on an ongoing basis. Exceptions taken to specific direction issued by the testing agency shall be brought to the attention of the engineer by the installing contractor.

B. The Contractor shall be certain that all systems are ready for proper operation prior to balancing and adjusting with clean filter and other system elements, e.g., coils. Temperature control calibration, electrical interface, etc., shall also be complete prior to balancing and adjusting. All equipment shall be freshly oiled. The Contractor shall instruct his employees and subcontractors to leave all balancing devices in a wide open position and free all operating arms and adjustments so that they

1. can be easily operated. The contractor shall write a letter to the testing agency indicating that each of the areas defined by the construction schedule is complete and ready for balancing.

C. The Contractor shall provide and coordinate the services of qualified, responsible subcontractors, suppliers and personnel as required to correct, repair, and/or replace any and all deficient items

or conditions found during the course of this project, including the testing, adjusting, and balancing period.

D. In order that all systems may be properly tested, balanced, and adjusted as required herein by these Specifications, the Contractor shall operate the systems at his expense for the length of time necessary to properly verify their completion and readiness for TAB.

E. Project Contract completion schedules shall allow for sufficient time to permit the completion of TAB services prior to Owner occupancy. The Contractor shall allow adequate time for the testing and balancing activities of the Owner provided services, during the construction period, and prior to Substantial Completion as defined in the Uniform General Conditions of this Construction Document.

F. The Drawings and Specifications indicate valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions, and it will be the responsibility of the Contractor to install these devices in a manner that will leave them accessible and readily adjustable. Should any such device not be readily accessible, the Contractor shall provide access as requested by the TAB Firm. Also, any malfunction encountered by TAB personnel and reported to the Contractor shall be corrected by the Contractor immediately so that the balancing work can proceed with the minimum of delays.

1.18 TEMPORARY HEAT/EQUIPMENT OPERATION

A. Provide temporary gas meter and connections to equipment provided by the General Contractor as required for temporary heat.

B. Warranties:
   1. The Contractor shall provide extended warranties for all equipment and mechanical system components operated prior to the date of substantial completion. The Contractor shall obtain in writing from the manufacturer extended warranties for all equipment such that the Owner's warranty starts at the date of substantial completion in accordance with the General Division 1 requirements. Any additional costs shall be the burden of the Contractor.

PART 2: PRODUCTS

2.01 SUBMITTALS

A. Submit product data for the following in accordance with requirements of Division 1 Specification Section 01300, “Submittals.”
   1. Transition fittings.
   2. Dielectric fittings.
   3. Mechanical sleeve seals.
   4. Escutcheons.

B. Welding certificates.

2.02 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
   1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
   2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. Required electrical modifications must be approved by the Electrical Engineer and be provided at no

additional cost to the Owner. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

2.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

C. Storage of materials and equipment shall not impede the work of other contracts.

D. Handling of equipment and products shall be according to manufacturers instructions and in compliance with the articles of their warranty.

E. Protect products from weather, unless product is slated for exterior installation. If outdoor storage is necessary, support products off the ground or pavement in watertight enclosures.

2.04 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

2.05 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.06 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
    a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.07 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

B. Plastic-to-Metal Transition Fittings: One-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

D. Plastic-to-Metal Transition Unions: MSS SP-107, four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

E. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.08 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint,
   1. plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

2.09 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
   1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
   2. Pressure Plates: Stainless steel. Include two for each sealing element.
   3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.10 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

2.11 ESCUTCHEONS

A. A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening. Provide with polished chrome plated finish.

2.12 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
   1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi, 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

PART 3: EXECUTION

3.01 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors:

M. Sleeves are not required for core-drilled holes.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
   1. Cut sleeves to length for mounting flush with both surfaces.
      a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
   2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
   a. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
   b. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.02 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free
1. solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
   1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
   3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
   4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
   5. PVC Nonpressure Piping: Join according to ASTM D 2855.
   6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
   1. Plain-End Pipe and Fittings: Use butt fusion.
   2. Plain-End Pipe and Socket Fittings: Use socket fusion.

M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.03 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:
   1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
   2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
   3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
   4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.04 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.05 PAINTING

A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.06 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
   1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
   2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
   3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
   4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   5. Install anchor bolts to elevations required for proper attachment to supported equipment.
   6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
   7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section.

3.07 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.08 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.09 GROUTING

A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 22 05 00

PART 1 GENERAL

1.01 SECTION INCLUDES

A. 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 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 butterflys, 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 butterflys, 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

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.

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.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 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:

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. 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.
2. 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.
3. 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.
4. 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.
5. 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	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.

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.

3.02 UPPER HANGER ATTACHMENTS

A. General:
1. Do not use flat bars or bent rods as upper hanger attachments.

3.03 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.

3.04 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.

3.05 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.

3.06 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

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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

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PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cleanout plug

B. Cleanout

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.

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

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PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation

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.

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
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)
C	Fluids (except domestic cold water) 40 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	1-1/2 & less Over 1-1/2	1 1-1/2
D	Domestic cold water, and as specified. 33 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	All Sizes	1/2

A. NOTES:
1. Sprinkler and Standpipe Piping (First 10 feet connected to domestic water main within building): Insulate with same materials and thicknesses specified for domestic cold water.
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 to140 F.	Flex. Elastomeric Foam or Fibrous Glass	1-1/2 & Less Over 1-1/2	1 2
F	Water and other fluids 141 F to 250 F.	Fibrous Glass	6 & Less 8 & Up	2 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

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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. Sanitary and storm piping and fittings

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 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 Silvabrite 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.

2.08 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.

2.09 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.

2.10 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.

2.11 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, Grosvenordale, 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.

2.12 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. Polyethylene Containment Pipe Joint: Follow manufacturer's printed installation instructions.

I. High Density Polyethylene Pipe Joint (HDPE): Follow manufacturer's printed installation instructions.

J. Hydraulic Pressed Joint: Follow manufacturer's printed installation instructions.

K. 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:

CONSTRUCTION	SLEEVE TYPE
Frame construction	None Required
Foundation walls	A*
Non-waterproof interior walls	B*
Non-waterproof interior floors on metal decks.	D*
Non-waterproof interior floors not on metal decks	B*
Floors not on grade having a floor drain	A
Floors over mechanical equipment, steam service, machine, and boiler rooms	A
Floors finished or to be finished with latex composition or terrazzo, and on metal decks	D*
Floors finished or to be finished with latex composition or terrazzo, and not on metal decks	A
Earth supported concrete floors	None Required
Exterior concrete slabs on grade	A
Fixtures with floor outlet waste piping	None Required
Metal roof decks	C
Non-metal roof decks	A
Waterproof floors on metal decks	D
Waterproof floors not on metal decks	A
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. Domestic Water (Above Ground):
1. 3 inch and Under: Type L hard drawn copper tube, with cast copper alloy or wrot 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.

C. 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.

D. 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 wrot copper drainage pattern fittings, and joints made with Type 3 solder.

E. 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 wrot copper drainage pattern fittings, and joints made up with Type 3 solder.

F. Drainage Piping (Below Ground):
1. Option No. 1: Extra heavy weight, coated, cast iron bell and spigot pipe and fittings, with calked joints.
2. Option No. 2: Extra heavy weight, coated, cast iron bell and spigot pipe and fittings, with rubber ring push-on joints.

G. 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. Lavatory

B. Supports and supporting devices for wall-mounted lavatories, sinks, and equipment

C. Countertop sink

D. Vitreous china water closets

E. Vitreous china urinals

F. Urinal carrier

G. 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: Ips standard weight, with standard weight, 125 lb cast brass fittings.
   2. Brass tubing: 18 B & S gage.
   3. Stainless steel: 18-8 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 VITREOUS CHINA URINALS

A. Wall Supported Fixture: Vitreous china, with elongated rim, integral trap and extended side shields.
1. Dimensions (approx.): 28 inches high, 18 inches wide, 12 inches front to back.
2. Method of Support: Wall hangers and lugs for bearing plate bolting.

B. Operation: Fixture shall flush satisfactorily with a maximum of 0.5 gallons of water and be accomplished without extraordinary rise in water level in the bowl.

C. Fixture Types:
   1. Type A Urinal: Floor supported, siphon jet action, with a bottom outlet and a 1-1/4 inch top spud inlet for an exposed flush valve connection.
   2. Type B Urinal: Wall supported, blowout action, back outlet and a 1-1/4 inch back spud inlet for a concealed flush valve connection.
   3. Type B-1 Urinal: Wall supported, blowout action, back outlet and a 1-1/4 inch top spud inlet for an exposed flush valve connection.
   4. Type C Urinal: Wall supported, washout action, back outlet, and a 3/4 inch back spud inlet for a concealed flush valve connection.
   5. Type C-1 Urinal: Wall supported, washout action, back outlet, and a 3/4 inch top spud inlet for an exposed flush valve connection.

2.07 URINAL CARRIER

A. Floor Mounted Carrier Support (For Wall Hung Urinals): 1-1/4 inch ips steel pipe upright supports with block feet arranged with provisions for bolting to the floor slab, and with the following:
   1. Hanger Plate: Steel, height adjustable with provisions for mounting and positioning the fixture hanger.
   2. Bearing Plate: Steel, adjustable, with bearing studs, nuts and washers.
   3. Studs, Nuts and Washers: Steel, treated for corrosion resistance.
   4. Fixture Washers: Plastic.
   5. Stud thread protectors.
   6. Factory Painted.
   7. Trim: Polished chrome plated metal cap nuts and washers.
   8. Vandal Resistant Trim: Polished chrome plated metal cap nuts and washers retained with vandal resistant set screws.

B. 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.

2.08 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 or Corrosion Engineers
22. NEBB National Environmental Balancing Bureau
23. NEC National Electrical Code (NFPA 70) / 2023

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 2025
3. New York State Fire Code 2025
4. New York State Existing Building Code 2025
5. New York State Fuel Gas Code 2025
6. New York State Plumbing Code 2025
7. New York State Energy Conservation Construction Code 2025
8. New York State Mechanical Code 2025
9. International Property Maintenance Code 2025
10. International Residential Code 2025
11. NYS ASHRAE 90.1 - 2025 - NYS version of the Energy Standard for Buildings Except Low-Rise Residential Buildings
12. 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 no 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, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Rigging Plan
      a. 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.
   2. Safety Data Sheets
   3. Training Plan & Schedule
   4. Training Verification Record

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 Fire Department or authority having jurisdiction.

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 SAFETY DATA SHEETS

A. Submit safety data sheets (SDS) 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).

1.15 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. Provide NEMA 4X weatherproof enclosures for VFDs, motor starters, etc. on all manufacturer provided or field installed electrical devices for equipment located outdoors, unless otherwise noted in specifications or plans.

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.

1.16 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.

1.17 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.

1.18 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.

1.19 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 2020 or later in .dwg format. Upon completion of the Work, submit a digital copy (PDF) to the Architect/Engineer for approval of the record

drawings, of the same size as the Drawings for approval. Upon approval by the Architect/Engineer furnish the Owner a digital copy (PDF) of the record drawings along with one hard copy for the Owner's 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. Notice of substantial completion Contractor shall submit written notice of substantial completion prior to requesting 'Substantial Completion Punchlist Inspection'.
   2. Air and hydronic test balance reports:
      a. Contractor shall submit all air and hydronic test balance reports a minimum of 5 days prior to requesting punchlist inspection.
      b. 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. Piping pressure test 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.
   4. 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).
   5. 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.
   6. Upon receipt of engineer's punchlist inspection report, the contractor shall respond to each comment with an acknowledgement of each item (initialed, dated and photo evidence of completed work) or disagreement and written explanation of disagreement.
   7. The contactor 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)
Chillers	16 hrs.
Cooling Towers	16 hrs.
Roof Top Units	8 hrs.
Air Handlers	8 hrs.
Boilers and Burners	16 hrs
DDC Control System	24 hrs.
All other equipment	4 hrs. (each)

Note: Consult individual equipment specification sections for additional training requirements.

H. Training Plan & Schedule Prepare a written schedule and agenda for each session and submit for review and approval. Include date, location, purpose, specific scope, proposed attendance and session duration.

I. Training Verification Record 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

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. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Fire Watch Procedure
   2. Welding/Burning Permits:
      a. 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.

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.

E. Prior to darining any system, confirm with building owner for the need to test or contain (store in tanks, etc.) any fluids to be drained (containing glycol, treatment chamicals, oils, etc.). Unless noted otherwise on contract documents, the cost of testing, storing, hauling and disposal shall be by the building owner.

F. Do not discharge to building floor drains or site storm drains without written approval by building owner.

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.

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.

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 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.

D. Prior to the removal of any existing ductwork, the Contractor shall provide the Engineer with a schematic layout of the existing ductwork systems for review and approval. This shall include the routing and layout of all existing supply and return ductwork, approximate dimensions, diffuser locations, and diffuser neck dimensions. This schematic shall be prepared during the verification of the existing conditions as required by the contract drawings. The layout shall be used as a basis for development of the proposed layout of the new sheet metal ductwork during the new work/construction phase.

3.08 INSULATION REMOVAL

A. Remove insulation, together with all piping, fittings, valves and equipment designated for demolition.

3.09 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.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the marking and identification materials for identifying mechanical equipment and ductwork systems.

B. Mark and identify all mechanical equipment and ductwork systems described herein, and as shown and specified in the Contract Documents.

1.02 REFERENCES

A. Z53.1 - Safety Color Code for Marking Physical Hazards.

B. OSHA 29 CFR 1910 - Subpart J, General Environmental Controls

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include, but not be limited to:
   1. Mechanical System Identification Product Data Submittal
      a. Product Data: Provide the manufacturer's catalog literature for each product required.
      b. Tags: Submit samples of tags, attachments, labeled, and identified.
   2. Identification Scheme
      a. Submit the scheme of identification codes.
      b. Equipment Schedules: Submit mechanical equipment schedules, listing proposed equipment numbers, their location, and function.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Seton

B. Bunting

C. W.H. Brady Company

2.02 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.

2.03 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 all tags and system markers in accordance with the manufacturer's instructions.

3.02 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.

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 for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include, but not be limited to:
   1. Certified Balancing Reports
      a. Testing, adjusting, and balancing agency certification: 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. Certified Balancing Reports: 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/Engineer before final acceptance.

C. The Architect/Engineer, or his representative, is the sole judge of the acceptability of the tests. The Architect/Engineer 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/Engineer.

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 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. Roof curbs.

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Roof Accessories for HVAC Systems Product Data Submittal
      a. Product Data: For each type of product indicated. Include construction details, materials, dimensions of individual components and profiles, and finishes.
   2. Roof Accessories for HVAC Systems Shop Drawings
      a. Shop Drawings: Show fabrication and installation details. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other Work.
   3. Roof Accessories for HVAC Systems Coordination Drawings
      a. Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:
         1) Size and location of roof accessories specified in this Section.
         2) Method of attaching roof accessories to roof or building structure.
         3) Other roof-mounted items including mechanical and electrical equipment, piping, and conduit.

1.04 QUALITY ASSURANCE

A. Standards: Comply with the following:
   1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
   2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

1.05 ROOF WARRANTY

A. All work performed in connection with new equipment on roof shall be performed and installed in accordance with roof manufacturer's recommendations. Contractor shall pay for and arrange for services of authorized representative of roofing manufacturer to inspect all work affecting roof and shall obtain statement of continuation of roof warranty from manufacturer. Contractor shall submit all roof work to architect and obtain approval.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Roof Curbs, Equipment Supports, Pipe Curb Assemblies or Pipe Portals, Pipe Mounting Pedestals, Duct Mounting Pedestals:
      a. Custom Curb, Inc.
      b. Pate Co. (The).
      c. Roof Products & Systems (RPS) Corporation.
      d. ThyCurb, Inc.

2.02 MATERIALS, GENERAL

A. Aluminum Sheet: ASTM B 209 for alclad alloy 3005H25 or alloy and temper required to suit forming operations, with mill finish, unless otherwise indicated.

B. Extruded Aluminum: ASTM B 221 alloy 6063-T52 or alloy and temper required to suit structural and finish requirements, with mill finish, unless otherwise indicated.

C. Galvanized Steel Sheet: ASTM A 653/A 653M with G90 coating designation; commercial quality, unless otherwise indicated.
   1. Structural Quality: Grade 40, where indicated or as required for strength.

D. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M with Class AZ-50 coating, structural quality, Grade 40, or as required for strength.

E. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.

F. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches thick.

G. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
   1. Where removing exterior exposed fasteners affords access to building, provide nonremovable fastener heads.

H. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.

I. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coating.

J. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

K. Elastomeric Sealant: Generic type recommended by unit manufacturer that is compatible with joint surfaces; ASTM C 920, Type S, Grade NS, Class 25, and Uses NT, G, A, and, as applicable to joint substrates indicated, O.

L. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

2.03 ROOF CURBS

A. General: Provide roof curbs capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

B. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.0747-inch-thick, structural-quality, hot-dip galvanized or aluminum-zinc alloy-coated steel sheet; factory primed and prepared for painting with welded or sealed mechanical corner joints.

C. Provide preservative-treated wood nailers at tops of curbs and formed flange at perimeter bottom for mounting to roof.

D. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.

E. Provide manufacturer's standard rigid or semirigid insulation.

F. Provide formed cants and base profile coordinated with roof insulation thickness.

G. Fabricate units to minimum height of 12 inches, unless otherwise indicated.

H. Sloping Roofs: Where slope of roof deck exceeds 1/4 inch per foot, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

2.04 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.05 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Conversion-Coated and Factory-Primed Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below).
   1. Organic Coating: Air-dried primer of not less than 2.0-mil dry film thickness.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

D. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.
   1. Color: As selected by Architect from the full range of industry colors and color densities.

E. 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 specifications for cleaning, conversion coating, and painting.
   1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 603.8 except with a minimum dry film thickness of 1.5 mils, medium gloss.
   2. Color: As selected by Architect from manufacturer's full range.

F. High-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.
   1. Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.
      a. For Spray Application: Comply with ASCA 96.
      b. For Coil-Coated Sheets: Comply with AAMA 620.
      c. Color and Gloss: As selected by Architect from manufacturer's full range.

2.06 GALVANIZED STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply the air-dried primer specified below immediately after cleaning and pretreating.
   1. Shop Primer: Exterior galvanized metal primer per Division 9 Section "Painting."

C. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

D. High-Performance Organic Finish: Cleaned and primed with inhibitive primer and organic coating as specified below. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   1. Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 621 for coil-coated sheets.
      a. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's written instructions. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to supporting structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.

B. For all rooftop supports (including pipe, conduit, and/or ductwork), install as per roof support manufacturer's instructions and roof manufacturer's instructions (to maintain existing roof warranty). Install every 10 feet minimum and every change in direction.

C. Installation shall also comply with the specification section for Vibration Isolation and Seismic Restraints.

D. Roof curbs and equipment rails shall be level at the top with pitch built-in when deck slopes ¼ of an inch per foot or greater.

E. Equipment Rails shall span a minimum of two (2) joists and not cantilever more than 6-inches.

F. Pipe mounting pedestals shall be mounted on top of deck over every other bar joist or not more than 10 feet on center.

G. Install roof accessory items according to construction details of NRCA's "Roofing and Waterproofing Manual," unless otherwise indicated.

H. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.

I. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.

J. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.

K. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.02 CLEANING AND PROTECTION

A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION

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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 Codes and Standards (currect adopte:
   1. 2025 Mechanical Code of New York State
   2. 2025 Energy Conservation Construction Code of New York State
   3. ASHRAE 90.1-2025

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. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Ductwork Insulation Product Data Submittal
      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 250º 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 450º 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. Flexible Fiberglass with mat f
   1. Conforming to ASTM C1071 Type 1 and NFPA 90A & 90B.
   2. Noise Reduction Coefficient (NRC): ASTM C423 Type A Mounting, 0.40 or higher for ½" product, 0.60 or higher for 1" product.
   3. Density: 1.5 or 2.0 PCF per application / thickness
   4. Rated for a maximum air velocity of 6,000 Feet per minute.
   5. Approved Products:
      a. Performance+ by Knauf or approved equal.

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

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. Apply metal nosing to upstream leading edge of 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 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
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.
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

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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 herein and as required by the CA, in reference to specifications or as otherwise required under standard care of the type of project and its 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 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Commissioning Plan for Approval
   2. Final Commissioning Report

1.05 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 electronic 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.

l. 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.

2. 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 Contract 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 diagrammatic logic for all TAB adjustments to the system.
r. Warranty Period. During the warranty period, the Contractor shall:
    1) Be available during seasonal or deferred functional performance testing conducted by the CA, according to the specifications.
    2) Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

1.06 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.

1.07 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. Electric Duct Heating Coils
2. Existing Packaged Rooftop Units with New APR Valves
3. Exhaust Fans
4. Dampers for miscellaneous HVAC Systems (including Outside AIr/Exhaust Air/Relief Air/Return Air).
5. Air Outlets (Test 10%)
6. ATC System (test functionality as it has been modified by systems above)

2.02 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 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 to 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 is 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 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

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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.

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.

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 Manger 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. BMS RESPONSIBILITY MATRIX: 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	HVAC Contractor	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	BMS	BMS	BMS	Electrical Contractor

WORK	FURNISH	INSTALL	LOW VOLT. WIRING/TUBE	LINE POWER
panels				
Packaged RTU Network Thermostats	BMS	BMS	BMS	Electrical Contractor
Packaged RTU factory-mounted controls	HVAC Contractor	HVAC Contractor	HVAC Contractor	Electrical Contractor

1.05 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Shop Drawings, Product Data, and Samples Submittal
      a. List of all shop drawings: The BMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.
      b. 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.
      c. Allow 15 working days for the review of each package by the Architect and Engineer in the scheduling of the total BMS work.
      d. 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.
      e. Index of all submittals and shop drawings: 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.
      f. The BMS Contractor shall correct any errors or omissions noted in the first review.
      g. At a minimum, submit the following:
         1) BMS network architecture diagrams: including all nodes and interconnections.
         2) Systems schematics, sequences and flow diagrams.
         3) Points schedule: for each point in the BMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.
         4) Graphic Display screen types and associated menus: Submit samples.
         5) Detailed Bill of Material: List for each system or application, identifying quantities, part numbers, descriptions, and optional features.
         6) 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.
         7) Details of all BMS interfaces and connections: to the work of other trades.
         8) 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. BMS 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. Building Management System (BMS): 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
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
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 brightens 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 2º F to 5º 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” NFT 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 that 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 26 Electrical. All wiring shall comply with the requirements of applicable portions of Division 26 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.
   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 26.
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
   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:
   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 of 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 a 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 for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Control Product Data Submittal
      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.
      b. Complete list of equipment: to be used indicating quantity, manufacturer and model number.
      c. Schedule of all control valves: including the valve size, model number (including pattern and connections), flow, CV, pressure rating, and location.
      d. Schedule of all control dampers: This shall include the damper size, pressure drop, manufacturer and model number.

e. 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.
f. The submittals required under this Section shall be considered as For Information Only. Review by the Architect/Engineer shall not relieve the Contractor from the responsibility of providing fully operational systems.
g. System Installer Qualifications: Submit qualification statement per the requirements outlined above.

2. Shop Drawings
   a. Sequence of operation: 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.
   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/Engineer 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. Interconnecting wiring diagrams: 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.

1.05 WARRANTY

A. Control system: 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/Engineer, 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/Engineer.

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 ½ 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 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 60730-1 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. Water Valves:
      a. Two-way: 150% of total system (pump) head.
      b. Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
   2. 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. Water Valves:
   1. Body and trim materials shall be as specified in “Pipe, Valve & Fittings” specification. Equal percentage ports for modulating service.
   2. Sizing Criteria:
      a. Three-way Modulating Service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), 5 psi maximum.
      b. Contractor shall verify sizing criteria with manufacturer.

E. 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 ±1% 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 ±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:

C A U T I O N

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. Control System: 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/Engineer 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

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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, troubleshooting, 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

2.01 MANUFACTURERS

A. Modify/extend the existing Somers Intermediate School automatic temperature control system as required to incorporate the HVAC equipment modifications.
   1. Company: ITC North Commercial
   2. Address: 7 Nancy Court, Suite 4, Wappingers Falls, NY 12590
   3. Contact: Kyle Moy
   4. Phone Number: (845) 204-8341

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 HVAC SEQUENCES

A. Electric Duct Heating Coils

B. Rawal Valves

3.03 ELECTRIC DUCT HEATING COILS

A. The electric duct heater manufacturer shall provide a complete packaged control system.

B. The room thermostat shall energize the stages of electric heat or proportionally control the electric heat output (see equipment schedule) in order to maintain room heating setpoint.

C. The integral differential pressure airflow switch shall de-energize the heater control circuit upon loss of airflow.

D. Automatic and manual thermal resets shall be provided.

E. A door interlocked disconnect switch shall also be provided.

F. Pilot lights on the heater terminal box shall include heater on, low airflow, and each stage on.

3.04 RAWAL VALVES

A. General
   1. A Rawal APR (Active Proportional Regulator) valve acts as a modulating capacity control, designed to match the air conditioner's cooling output to the actual, often reduced, load of the space, thereby extending the cooling cycle and improving dehumidification. It operates based on suction pressure to bypass hot gas directly into the suction line, keeping the system operating under low-load conditions without freezing the coil or short-cycling the compressor.
   2. Rawal valves shall be furnished and installed on existing Trane rooftop units:
      a. AC-1 to 12 except for AC-4 (which has hot gas reheat).

B. Typical Sequence of Operation (APR Valve)
   1. The Rawal valve (mechanically operated type) follows this sequence during a cooling cycle:
      a. System Startup (Full Load): When the thermostat calls for cooling, the compressor starts. The Rawal APR valve remains closed. The system operates at full capacity (100%).
      b. Part-Load/Low-Load Condition: As the space reaches the set temperature, the sensible load drops. The suction pressure begins to drop because the evaporator is not receiving enough heat from the return air to boil the liquid refrigerant fully.
      c. APR Valve Initiation: When the suction pressure falls to the valve's set point (typically factory set around 118-120 psig for R-410A, 60 psig for R-22), the APR valve begins to modulate open.
      d. Hot Gas Bypass (Modulation): The valve diverts hot, high-pressure discharge gas from the compressor through its desuperheating chamber and into the suction line.
         1) This increases the suction pressure at the compressor inlet.
         2) This reduces the compressor differential, lowering its horsepower and power consumption.
         3) By adding heat to the suction side, it effectively reduces the capacity of the evaporator coil to match the low-load condition.
      e. Liquid Injection (Protection): During deep modulation (when the valve is open significantly), the desuperheating chamber automatically injects a small amount of liquid refrigerant (fed from the liquid line) into the hot gas bypass stream. This prevents the suction gas from becoming too hot and damaging the compressor.
      f. Thermostat Satisfaction: When the thermostat is satisfied, the liquid line solenoid closes, the compressor shuts down, and the APR valve closes, completing the cycle.

C. Key Operational Aspects
   1. Continuous Modulation: The valve does not just open 100%, but modulates the bypass flow continuously to keep the suction pressure stable at its set point, regardless of the load.

2. Dehumidification: Because the APR allows the compressor to run longer at a lower capacity, the evaporator coil stays active longer, which significantly improves moisture removal (dehumidification).
3. Adjustment: While factory-set, the suction pressure set point can be adjusted. Turning the screw counterclockwise increases the set point (opens earlier), and clockwise decreases it.

END OF SECTION

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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 230594.12 - 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, SMACNA, and New York State Mechanical Code standards.

1.05 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:

1. Ductwork Shop Drawings
    a. Coordinate layout duct drawings that differ from ductwork shown on the Drawings.
    b. 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.
    c. Deviations such as changing direction or transforming or dividing ductwork must maintain ductwork cross-sectional area and not exceed transformation taper of 15 degrees.
    d. Plans and section showing all equipment and accessories.
    e. Minimum 3/8 in. scale, double line, showing sizes, transverse joints, transitions, elevations, clearances and accessories; sections where required.
2. Sheet Metal Product Data Submittal
    a. Submit product data for materials and equipment listed within Part 2 of this specification.

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 as detailed in SMACNA HVAC Duct Construction Standards Metal and Flexible.
1. Single thickness 2" or 4" vanes up to 36" length.
2. Double wall 2" vanes up to 48" length.
3. Double wall 4" vanes up to 72" length.

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 then 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 12 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.

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 or Engineer approved equivalent.

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 or Engineer approved equivalent.

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 gauge 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 COMBINATION FIRE SMOKE DAMPERS

A. Fabricate and install in accordance with NFPA 90A and UL Safety Standards 555 & 555S, 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. Leakage Class: Leakage Class II per UL 555S

D. Fusible links, UL 33, shall separate at 165 degrees F.

OR

E. Resettable links shall be provided in lieu of a fusible link. Resettable link shall interrupt power to the actuator causing the actuator's spring return mechanism to cause the damper to close at 165 degrees F. Resettable link to be provided with an electric sensor (thermostat). Sensor to be of

the manual reset type and shall be capable of being reset after the temperature has cooled down below the sensor set point.

F. Pressure Differential Rating: 4 In. w. g.

G. Air Flow Velocity: 2000 fpm

H. Elevated Temperature Rating: 350 Deg. F per UL555S

I. 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.

J. Actuators: 24 VDC, 2-position, external mounting

K. Acceptable Manufacturers:
   1. Greenheck Model FSD-211
   2. Ruskin Mfr. Co.
   3. Arrow Damper & Louver.
   4. Imperial Damper Co.

2.11 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 6 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. or Engineer approved equivalent.

2.12 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. Flexflow elbow, Malco FDS1, or equal.

M. Attachment collars shall be minimum 2 inches in length.

2.13 GALVANIZED STEEL ROUND DUCTS AND FITTINGS

A. Construct ducts of galvanized sheet steel meeting ASTM A653 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.

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. Ducts shall be supported with approved hangers at intervals not exceeding 10 feet or in accordance with SMACNA HVAC Standard for Metal and Flexible Ductwork (whichever is more stringent). Flexible and other factory made ducts shall be supported in accordance with the manufacturer's instructions.

C. Do not support ductwork from furring, hung ceilings, metal floor deck, metal roof deck or from another duct or pipe.

D. Do not hang lighting fixtures or piping from ductwork.

E. Do not use perforated band iron.

F. Support ductwork at each change in direction.

G. 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.

H. 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.

I. 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 indirection 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 ±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	

A. 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 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.

3.09 DUCTWORK MATERIAL SCHEDULE

AIR SYSTEM	DUCTWORK MATERIAL
SUPPLY, OUTSIDE AIR & EXHAUST DUCTWORK	GALVANIZED STEEL

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 herein, and as scheduled and in locations shown on drawings.

B. Products listed in Part 2 of this Section include:
   1. Centrifugal Downblast Roof Fans

1.02 ACCESSORIES:

A. Provide accessories as scheduled. Refer to the control diagrams and specifications, sequence of operations specifications, and the electrical drawings for detailed requirements.
   1. Back draft dampers
   2. Motorized dampers with appropriately sized actuators
   3. Motor speed controls: Interlocks, controls, and monitoring devices
   4. Disconnect switches
   5. Roof curbs
   6. Curb Adapters
   7. Wind or seismic restraints, guy wires, etc.

1.03 RELATED WORK

A. Section 061000: Rough Carpentry

B. Section 079200: Joint Sealants

C. Section 230010: General Mechanical Requirements

D. Section 230594.12: Balancing of Air Systems

E. Section 230991: Instrumentation and Controls Integration

F. 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. Submit for review, products utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Exhaust Fan Product Data Submittal
      a. Assembly 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 GENERAL

A. See exhaust fan equipment schedules on the drawings for addtional information, requirements, and accessories.

2.02 CENTRIFUGAL DOWNBLAST ROOF FANS

A. Roof mounted exhaust fans shall be of the 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. 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.

E. A NEMA 3R disconnect switch shall be provided as standard. Factory wiring shall be provided from motor to the handy box.

F. All fans shall bear the AMCA Certified Ratings Seal for both sound and air performance.

G. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

H. Fans shall be Greenheck model G (downblast), or Engineer approved equivalent.

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

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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. Submit for review, products utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:
   1. Diffusers, Registers, and Grilles Product Data Submittal
      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. General:
   1. Typical for all diffusers sypplying conditioned air:

a. Provide with molded fiberglass insulation blanket with foil back vapor barrier minimum R 4.2.

B. Square Ceiling Diffusers:
1. Furnish and install ceiling diffusers of the sizes and capacities as shown on the Drawings.
2. Manufacture the diffuser from corrosion-resistant steel.
3. Diffuser shall have three cones, with each cone having a die-stamped, single piece construction. Diffuser shall have adjustable vanes to vary the discharge pattern between horizontal and vertical.
4. Diffuser shall supply air in a 360-degree discharge pattern to help prevent ceilings from streaking or smudging.
5. Manufacture diffusers with trim to allow for a face panel flush with the ceiling line into 2'x2' lay-in grid ceiling.
6. Provide each diffuser with a volume damper located in the duct branch..
7. Provide an equalizing grid for field installation for each diffuser.
8. Manufacturer: Titus TMSA, Nailor, Price, or approved equal.
9. Coordinate color with Architect / Owner.

2.02 RETURN GRILLES

A. Furnish and install return grilles of the type and size as shown on the Drawings.

B. Grilles shall be egg crate-style grilles with a free area of at least 90%. Grilles and outer border shall be constructed of heavy duty extruded aluminum. Core dimensions shall be 1/2" x 1/2" x 1/2".

C. Manufacture grilles with trim to allow for recessed mounting into 2'x2' lay-in ceiling grids. 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. Manufacturer: Titus 50F, Nailor, Price, or approved equal.

E. Coordinate color with Architect / 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

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PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

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.

1.03 SUMMARY

A. This Section includes the following:
   1. Electric duct heating coils.

1.04 SUBMITTALS

A. Product Data: Include rated capacities of selected models; heating capacities, pressure drop; shipping, installed, and operating weights; installation instructions; and startup instructions for each type of product indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems, and differentiate between manufacturer-installed and field-installed wiring.

C. Maintenance Data: For electric duct heating coils to include in maintenance manuals specified in Division 01.

1.05 QUALITY ASSURANCE

A. Electric duct heating coils shall meet the requirements of the National Electric Code (NEC) and shall be UL Listed.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.06 WARRANTY

A. Provide the manufacturer’s standard warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Electric Coils:
      a. Brasch Manufacturing.
      b. Chromalox.
      c. Greenheck.
      d. Indeeco (basis of design)
      e. Marley Engineered Products.
      f. Nailor.
      g. Tutco.
      h. Watlow

2.02 ELECTRIC DUCT HEATING COILS

A. Electrical Heating Coils, Controls, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Approvals: Heaters shall meet the requirements of the National Electric Code (NEC) and shall be listed by Underwriters Laboratories (UL) for zero spacing between duct and combustible surfaces and for use with heat pumps and air conditioning equipment.

C. Heater Frame: Heater frames and terminal boxes shall be corrosion resistant steel. Unless otherwise indicated, the terminal box shall be NEMA type 1 construction and shall be provided with a hinged, latching cover and multiple concentric knockouts for field wiring.

D. Heating Elements: Heating elements shall be 80 percent nickel and 20 percent chromium, Grade A resistance wire. Type C alloys containing iron or other alloys are not acceptable. Coils shall be machine crimped into stainless steel terminals extending at least 1" into the airstream and all terminal hardware shall be stainless steel. Coils shall be supported by ceramic bushings staked into supporting brackets.

E. Overtemperature Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through the terminal box without removing the heater from the duct or the unit.
   1. Secondary Protection: Load-carrying, manually reset or manually replaceable, thermal cutouts; factory wired in series with each heater stage.

F. Control Panel: Unit mounted or Remote mounted as specified on the drawings with disconnecting means and overcurrent protection. Include the following controls:
   1. Magnetic contactor.
   2. SCR (silicon-controlled rectifier) controller for proportional power control or a step controller for stages of heat (as specified on the drawings).
   3. Time-delay relay.
   4. Pilot lights; one per step.
   5. Airflow proving switch.
   6. Fuses for greater than 48 amps.
   7. Control circuit transformer.
   8. Thermal cutouts.
   9. Built-in, snap-acting, door-interlocked disconnect switch.

G. Heaters shall be rated for the voltage, phase, and number of heating stages indicated on the drawing schedules. All three-phase heaters shall be equal, balanced, three-phase stages. All internal wiring shall be stranded copper with 105 degrees C insulation and shall be terminated in crimped connectors or box lugs.

H. Thermostats: Controls and thermostats shall be coordinated with the building's automatic temperature control system. Duct-mounted modulating thermostats, with a temperature range from 0 to 100 degrees Fahrenheit (37.78 degrees Celsius), and 2.5 degrees Fahrenheit (-16.39 degrees Celsius) throttling range; and with 1/2-by-4-1/2-inch sensing bulb and 60-inch capillary.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine ducts, plenums, and units to receive electric duct heating coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install electric duct heating coils in accordance with the manufacturer’s published installation instructions.

B. Install coils level and plumb.

C. Install coils in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."

3.03 CONNECTIONS

A. Ground equipment.
   1. Tighten electrical connectors and terminals according to the manufacturer's published torque-tightening values. If the manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.04 ADJUSTING

A. Adjust initial temperature set points.

B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3.05 CLEANING

A. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

B. Clean coils using materials and methods recommended in writing by manufacturers, and clean the inside of casings and enclosures to remove dust and debris.

END OF SECTION

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavation and backfill for electrical work.

B. Demolition of existing electrical systems.

C. Secondary power wiring and distribution system.

D. Wiring devices.

E. Wiring for built-in equipment.

F. Distribution panels and switches.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All materials and equipment used in carrying out these specifications shall have UL listing and label. Specifications and drawings indicate name, type, or catalog numbers of materials and equipment to be used as standards. Proposals shall be based on these standards. Contractor may use materials and equipment equivalent to those specified, subject to Engineer's approval.

PART 3 - EXECUTION

3.01 COORDINATION

A. Carefully examine specifications, drawings and project site to be thoroughly familiar with items which require electrical connections and coordination. Electrical drawings are diagrammatic and shall not be scaled for exact sizes.

B. Notify other Contractors of any deviations or special conditions necessary for the installation of work. Interferences between work of various contractors to be resolved prior to installation. Work installed not in compliance with specifications and drawings and without properly checking and coordinating as specified above shall, if necessary, be removed and properly reinstalled without additional cost to the Owner. Engineer to be mediating authority in all disputes arising on project.

C. Equipment shall be installed in accordance with manufacturer's recommendation. Where conflicts occur between contract documents and these recommendations, a clarification shall be requested of the Engineer for decision before preceding with such work.

D. Insofar as it is possible to determine in advance, advise masonry tradesmen to leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should the Contractor neglect doing this, any cutting and/or patching required to be done is at this Contractor's expense.

E. FIRE ALARM – For any facilities that utilize an existing fire alarm system, the contractor shall coordinate with the owner and fire alarm monitoring company prior to removing or disabling any devices. It shall be the contractor’s responsibility to provide fire watch as per the latest addition of the Fire Code of New York State. The contractor shall provide fire watch for all areas of a facility while occupied and unoccupied when any device or part of the fire alarm system is de-activated or put into “test mode”.

3.02 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of work under this Division.

B. Correct unnecessary damage caused due to installation of electrical work, brought about through carelessness or lack of coordination.

C. Holes cut through floor slabs to be core drilled with drill designed for this purpose. All openings, sleeves, and holes in slabs to be properly sealed, fire proofed and waterproofed.

D. Repairs to be performed with materials which match existing materials and to be installed in accordance with appropriate sections of these specifications.

3.03 TESTS

A. On completion of work, installation shall be completely operational and entirely free from ground, short circuits, and open circuits. Perform a thorough operational test in presence of the Engineer. Balance all circuits so that feeders to panels are not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials and instruments for above tests.

B. Furnish Engineer with a copy of such tests including identification of each circuit and readings recorded, also the main service ground resistance test as described in Section 260526 of these specifications. Test information to include ampere readings of all panels and major circuit breakers, isolation resistance reading of motors and transformers.

3.04 IDENTIFICATION OF EQUIPMENT

A. Properly identify the following:
   1. Distribution panels.
   2. Disconnect switches.
   3. Individually mounted circuit breakers.

B. Use permanently attached black phenolic plates with 1/4-inch white engraved lettering on the face of each, attached with two sheet metal screws.

C. Panelboard identification plates shall indicate panel by name.

3.05 INSTALLATION

A. The Contractor shall carefully move and replace existing equipment, appliances and all related items, as required to conduct proposed work.

B. Install and conduct all work per applicable NEC, State and local codes.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of temporary work.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable code for demolition work, safety of structure and dust control.

B. Obtain required permits from authorities.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct egress width to exits.

E. Do not turn off electric equipment without authorization from Owner.

F. Conform to procedures applicable when discovering hazardous or contaminated materials.

1.04 SCHEDULING

A. Schedule Work to coincide with new construction.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify field circuiting arrangements at the School.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on visual field observation. Report discrepancies to the Engineer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing condition.

3.02 PREPARATION

A. Provide power, wiring and connections to maintain all existing power, control and telemetry systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction, as indicated on drawings.

B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

D. Repair adjacent construction and finishes damaged during demolition and extension work.

E. Provide caps and filler plates/plugs for all openings in equipment and enclosures after removal of conduits.

F. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

G. Remove demolished materials from site as work progresses.

H. Completely remove and dispose of all electrical power, control, and telemetry feeds including conduits, conductors, boxes and supports not scheduled to remain after new construction is tested and operational.

I. Where existing devices and equipment are called to be removed, Contractor shall maintain circuit continuity to all existing devices and equipment remaining on that circuit. Contractor shall provide all required conduit, conductors and boxes as required.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Remove temporary work.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wires and cables.

B. In general, the wires and cables included under this Section shall include, but not be limited to, the following:
   1. 600V power and control cable
   2. Communication cables

C. All conductors to be continuous from origin to panel or equipment termination without splices.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NECA Standard of Installations.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

1.04 QUALITY ASSURANCE

A. Products used in the work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Engineer as specified herein and in accordance with the General Conditions.

B. Contractor shall submit the following information pertaining to the manufacturer(s):
   1. Complete literature, performance, and technical data describing the proposed equipment and listing of items made by the manufacturer.
   2. Location of closest service office from which this equipment shall be serviced.
   3. Location of closest parts inventory for item installation.

1.05 COORDINATION

A. Coordination:
   1. Coordinate wire and cable required with the equipment being furnished by others for the satisfactory operation of the equipment or system.
   2. Review installation procedures under other sections and contracts and coordinate them with the work specified herein.
   3. Notify other prime contractors in advance of the installation of the work included to provide them with sufficient time for installation and coordination of interrelated items that are included in their contracts and that must be installed in conjunction with the work included in this Section.

1.06 PROJECT CONDITIONS

A. Verify that embedded conduit, in masonry and concrete, is installed as shown on the Drawings prior to the work being enclosed by others.

B. The Contractor shall be present at all concrete pours made by the General Contractor.

C. Conductor sizes are based on copper at 75°C.

D. Wire and cable routing shown on Drawings is approximate unless dimensioned or specifically called for such as where conduit is to be embedded in concrete or masonry. Route wire and cable as required to meet project conditions and shall be routed above ceilings, directly under joists, in pipe trenches, where available, and in masonry. Where exposed conduit is permitted, it shall be run to maximize wall space.

E. Field verify destination location to determine cable routing.

F. Where wire and cable routing is not shown for proposed destination, determine exact routing and lengths required. Routing shall be reviewed with the Engineer.

PART 2 - PRODUCTS

2.01 CONDUCTORS

A. Install products in accordance with manufacturer's recommendations.

B. Single copper conductors with 600-volt insulation.

C. Minimum size of feeder conductors and grounds shall be No. 12 AWG.

D. Insulation: No. 12 AWG and No. 10 AWG, provide ANSI/NFPA 70, Type THWN-2 for interior circuits and type XHHW-2 for exterior circuits. Exterior circuits shall be considered circuits where any portion of the circuit is run exterior of the building, in which case the entire length of the circuit shall be continuous wire of Type XHHW-2.

E. Use solid conductor for feeder and branch circuits, 10 AWG and smaller.

F. All conductors shall include complete set of manufacturer's markings for insulation and conductor size.

G. Manufacturers shall be SOUTHWIRE, PRYSMIAN GROUP, OKONITE, ANIXTER or approved equal.

H. Provide white colored neutral conductors; provide black, color coded phase conductors; provide green colored ground conductors.

2.02 4-PAIR CATEGORY 6A UNSHIELDED TWISTED PAIR CABLE

A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
   1. Belden Corporation, Carmel, IN (800) 246-2673.
   2. Avaya, Basking Ridge, NJ (800) 344-02232.
   3. Berk-Tek, Incorporated, New Holland, PA (800) 237-5835.
   4. CommScope, Hickory, NC (800) 982-1708.
   5. Draka Comteq, Franklin, MA (888) 541-7100.
   6. General Cable, Highland Heights, KY (800) 424-5666.
   7. Mohawk/CDT Leominster, MA (978) 537 9961.
   8. NORDX/CDT, Worcester, MA (800) 331-0779.
   9. Superior Essex, Atlanta, GA. (800) 685-4887.
   10. Tyco Electronics, Harrisburg, PA (800) 522-6752.

B. Conductors: 4 twisted pair - 24 AWG, solid copper w/ RJ-45 connector ends
   1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
   2. Complies with individual characteristics established in ANSI/TIA/EIA-568-B, and all addendums for Category 6 cable performance specification.
   3. Overall Nominal Diameter: .365 x .165 in.
   4. Nominal Impedance: 100 ohms plus or minus 15 percent.
   5. Certified capable of performing to minimum 350 MHz.

C. Mechanical Characteristics
   1. Operating temperature: -20°C to +80°C
   2. Bulk cable weight: 29 lbs./1000 ft.
   3. Maximum recommended pulling tension: 45 lbs.
   4. Minimum bend radius: 1 in.

D. Flame test: UL1666 Riser

E. Electrical Characteristics:
   1. Nom. Mutual Capacitance @ 1 KHz 15.0 pF/ft
   2. Maximum Capacitance Unbalance (pF/100 m) 49.2 pF/100 m
   3. Nominal Velocity of Propagation 70 %
   4. Maximum Delay (ns/100 m) 510 @ 100MHz ns/100 m
   5. Maximum Delay Skew (ns/100m) 25 ns/100 m
   6. Maximum Conductor DC Resistance @ 20 Deg. C 9 Ohms/100 m
   7. Maximum DCR Unbalance @ 20 Deg. C 3 %
   8. Max. Operating Voltage - UL 300 V RMS

2.03 MECHANICAL CONNECTORS

A. Conductor tapping connectors shall be BURNDY Servit split bolt, Series KS and KS3, or approved equal.

B. Split bolt connectors shall use BURNDY Type SC Servit cover on indoor applications.

C. Terminal lugs shall be BURNDY Universal Terminal Series. Terminal lugs shall be sized for proper ampacity and proper number of conductor holes. Each conductor shall occupy only one hole on a terminal lug.

D. Conductor tapping connectors for multiple conductors shall be BURNDY Series V-Tap with V-Tap covers, and V-Blok mounting platforms.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Make terminations in accordance with cable manufacturers instructions for the particular type of wire and cable.
   2. Splices are not allowed in the underground duct and manhole systems. If splices are required, the Contractor shall obtain approval in writing from the Engineer prior to splicing.
   3. All splices shall be in made in terminal boxes.

B. Wire and Cable Sizes: The sizes of wire and cable shall be as shown on the Contract Drawings, or if not shown, as approved by the Engineer. Minimum size wire shall be No. 12 AWG for all power, lighting and receptacle circuits. Wires for control circuits shall be No. 14 AWG minimum. Wire for instrumentation circuits shall not be smaller than No. 16 AWG. If due to field routing the voltage drop exceeds 2.5%, the size of conductors shall be increased such that 2.5% is the maximum voltage drop incurred.

C. Number of Wires: The number of wires indicated on the Contract Drawings for the various control, indications, and metering circuits were determined for general schemes of control and for particular indication and metering systems. Coordinate wiring schemes with equipment schematics.

D. Wiring Identification: All wiring shall have a unique wire number and be labeled at both ends. Wire numbers shall correspond with the equipment terminal wire numbers. Where no wire numbers are indicated, the Contractor shall assign wire numbers. Wire numbers shall not be duplicated.

E. Cable Identification Tags: The Contractor shall furnish all labor and materials and affix in a permanent way to each cable in manholes, cable compartments and vaults, junction boxes, pull boxes and points of termination, a laminated plastic tag, bearing clearly printed, the cable number indicated on the Contract Drawings or some other approved identification number or symbol. All cables shall be temporarily tagged with its full ID number immediately after it has been pulled.

F. Wiring Supplies: Only electrical wiring supplies manufactured under high standards of production and meeting the approval of the Engineer shall be used. Friction tape shall be in accordance with ASTM D69.

G. Training of Cable: Furnish all labor and material required to train cables around cable vaults within buildings and in manholes in any outdoor underground duct system. Sufficient length of cable shall be provided in each manhole and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. All manhole cables shall be arc and fireproofed.

H. Connections at Control Panels, Limit Switches and Similar Devices:
   1. Where stranded wires are terminated at panels, and/or devices connections shall be made by solderless lug, crimp type ferrule or solder dipped.
   2. Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make 7-strand, No. 12 AWG, wire terminations impractical, the Contractor shall terminate external circuits in an adjacent junction box of proper size and shall install No. 14 AWG stranded wires to the junction box in a conduit.

I. Pulling Temperature: Cable shall not be flexed or pulled when the temperature of the insulation or of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature within a three day period prior to pulling of 40°F or lower, cable reels shall be stored during the three day period prior to pulling in a protected storage with an ambient temperature not lower than 55 degrees F and pulling shall be completed during the work day for which the cable is removed from the protected storage.

J. Color Coding:
   1. Conductor jacket shall be color coded as follows:

AC POWER

480V/277 Volt 3 phase	**208Y/120 Volt 3 phase (PSEGLI)**	**208Y/120 Volt 3 phase (NEC)**	**240/120 Volt 3 phase (PSEGLI)**	**240/120 Volt 3 phase (NEC)**
Phase A Brown	Phase A Blue	Phase A Black	Phase A Blue	Phase A Black
Phase B Orange	Phase B Black	Phase B Red	Phase B Black	Phase B Orange (HiLeg)
Phase C Yellow	Phase C Red	Phase C Blue	Phase C Orange	Phase C Blue
Neutral White	Neutral White	Neutral White	Neutral White	Neutral White
Ground Green	Ground Green	Ground Green	Ground Green	Ground Green

   2. Equipment Ground - GREEN

3.02 IDENTIFICATION

A. Identify wire and cable under provisions of Section 260553.

B. Identify each conductor with its circuit number.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014500.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Field Testing:
   1. Wires and cables shall be tested before being connected to motors, devices or terminal blocks.
   2. If tests reveal defects or deficiencies, the Contractor shall make the necessary repairs or shall replace the cable as directed by the Engineer, without additional cost to the Owner.
   3. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment.

E. Continuity Tests: All cables, wires and shields shall be tested for continuity. Testing for continuity shall be by test light or buzzer.

F. Insulation-Resistance Tests:
   1. 600V power and control cables and wires shall be tested for their insulation-resistance values. Test shall utilize a megohmmeter with applied voltage to be 1000VDC for one (1) minute. Insulation-resistance test shall be performed on each conductor with all other conductors grounded. The resistance value shall be 20 megohms or greater.

END OF SECTION

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 COMPONENTS

A. Ground clamps:
   1. OZ ELECTRICAL MANUFACTURING COMPANY, Type "CG" for connection to water main piping and Type "GC" for connection to ground rod; with cable installed parallel or 90 degrees to pipe/rod under separate clamp.
   2. Or equal by STEEL CITY or APPLETON

B. Raceways, conductors, outlet boxes, pull and junction boxes to be furnished in accordance with applicable sections of these specifications.

C. Rod Electrode: Solid Copper, 3/4-inch diameter, 10 feet long.

D. Wire: Copper, sized to meet NFPA 70 requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Clean all conductive surfaces on equipment to be grounded, to assure good electrical continuity.
   2. Effectively bond all grounding conductors to grounding rod electrodes, equipment enclosures and ground busses.
   3. Locate all grounding attachments away from areas subject to physical damage. Provide protective covering as required.

B. Feeder/Branch Circuits:
   1. All circuits shall have a separate green grounding conductor in conduit sized in accordance with NFPA 70. Minimum size of conductor shall be No. 12 AWG.
   2. Flexible conduit will not be approved as achieving continuity of ground. All flexible conduit to have a jumper wire sized to ampacity of branch breaker and to be connected to conduit system on both ends; this applies to fixtures, motors, controls, etc.

C. Transformers:
   1. Transformers shall be grounded and grounding conductors and conduits sized in accordance with NFPA 70.

3.02 TEST

A. Test ground on main service. Ground system resistance shall be no greater than 10 ohms using test equipment similar to a "Biddle" test. Test data to be submitted to the Engineer for approval and such approved test data to become a part of the Record Documents.

END OF SECTION

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. System of supporting devices and hangers for support or bracing for conduit, electrical equipment, safety switches, fixtures, panelboards, outlet boxes, junction boxes and cabinets.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 EQUIPMENT REQUIREMENTS

A. Provide appropriate corrosion-resistant supporting devices and hangers for electrical equipment, as manufactured by ERICO PRODUCTS, INC., CADDY FASTENERS, STEEL CITY, MINERALLAC or equivalent.
   1. "Z" purlin clips.
   2. Conduit clips.
   3. Beam clamps (universal and vertical flange).
   4. Beam clamps (set screw type).
   5. Combination push-in conduit clips.
   6. Combination conduit hanger clamps.
   7. Flexible conduit clips.
   8. Special combination conduit clips.
   9. One hole steel straps.
   10. Conduit hangers.

B. Provide materials, sizes and types of anchors, fasteners and supports to carry the loads of equipment, wire in conduit and conduit.

2.02 CHANNEL SUPPORT SYSTEM

A. Channel systems and supports shall be manufactured by KINDORF/THOMAS & BETTS, or approved equal.

B. Channels shall be 1-1/2" x 1-1/2".

C. Channels and all associated accessories and bolts shall be hot dipped galvanized.

D. Channels shall have 9/16" bolt holes on 1-1/2" centers.

E. Provide end caps for all channels.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Secure conduits to within 3 feet of each outlet box, junction box, cabinet, fitting, etc., and at intervals not to exceed 10 feet in accordance with currently effective edition of the National Electric Code.

B. In seismic zones, support conduits 1 inch and smaller at 6 foot intervals.

C. Install clamps secured to structure for feeder and other conduits routed against structure. Use drop rods and hangers to support conduits run apart from the structure.

D. Provide and install suitable angle iron, channel iron or steel metal framing with accessories to support or brace electrical equipment including safety switches, fixtures, panelboards, etc.

E. Paint all supporting metal not otherwise protected, with rust inhibiting primer and then with a finish coat if appropriate to match the surrounding metal surfaces. Prepainted or galvanized support material is not required to be painted or repainted.

F. Do not use chains, perforated iron, baling wire or tie wire for supporting conduit runs. Use of clips to support conduit to top of t-bar ceiling grid will not be permitted.

G. Obtain permission from Engineer before drilling or cutting structural members.

H. Install surface mounted cabinets and panelboards with a minimum of four anchors.

I. Do not fasten supports to pipes, ducts, mechanical equipment and conduit.

J. Install products in accordance with manufacturer's instructions.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit system with associated couplings, connectors and fittings. Conduits to be mechanically and electrically continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.
   1. Conduit Use - Rigid Galvanized Conduit:
      a. All exterior circuits above ground.
   2. Conduit Use - PVC Sch. 80
      a. All exterior circuits below ground.
   3. Conduit Use - Electrical Metallic Tubing (EMT) Conduit:
      a. All interior circuits above ground.
   4. Conduit Use - Metal Clad (MC) Cable:
      a. All 15 and 20 amp branch circuits concealed in walls or ceilings.
   5. Conduit Use - Flexible Liquid-tight Metal Conduit:
      a. Connecting motors, generators and other equipment subject to vibration, maximum length - 3 feet.
      b. Passing through building expansion joints.
   6. J-Hooks
      a. For use above finished ceilings for CAT 6 data cable only.

B. Device Boxes: Provide each fixture switch, receptacle and other wiring device with a box of appropriate size and depth for its particular location use unless indicated otherwise.

C. Pull boxes, junction boxes and wire troughs

1.02 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI/NFPA 70 - National Electric Code.

C. NECA Standard of Installation.

D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

E. NEMA TC 3 - PVC Fittings for use with Rigid PVC conduit and tubing.

F. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

G. ANSI/NEMA OS1 - Sheet-steel outlet boxes, device boxes, covers and box supports.

H. NEMA 250 - Enclosures for electrical equipment (1000 volts maximum).

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Shop Drawings, prior to start of work:
   1. Manufacturer’s catalog cuts for the conduit, boxes, fittings and supports proposed for use.
   2. Contractor shall not proceed with the installation of materials until all the above is submitted, reviewed, and approved.

1.04 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc.

B. Conform to requirements of ANSI/NFPA 70.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 017839.

B. Accurately record actual routing of all conduits.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products in accordance with manufacturers' recommendations.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing abovegrade. Provide appropriate covering.

1.07 PROJECT CONDITIONS

A. Verify all conduit routings by field measurements.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system. Provide all required sweeps, boxes and fittings.

PART 2 - PRODUCTS

2.01 RIGID GALVANIZED CONDUIT

A. Rigid conduit shall be hot dipped, galvanized, or electro-galvanized steel by Wheatland, Triangle, Republic or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR or approved equal. Catalog numbers used below are those of THOMAS & BETTS CORP. based on 3/4-inch size and are considered standards by which equivalents are to be judged.

C. ERICKSON couplings, Series 676 or approved equal, shall be used where neither length of conduit can be rotated.

D. Conduit connectors shall be threaded type. Set screw and compression type connections ARE NOT acceptable.

E. Sealing fitting locknuts shall be Series 142SL.

F. Steel or malleable iron insulated bullet hub, Series 370-379, complete with sealing "O" ring. DO NOT use "die cast" material.

G. Entrance ells shall be Series 1491 or approved equal.

H. Combination coupling shall be Series 531 for connecting rigid galvanized conduit to electrical metallic tubing.

2.02 PVC CONDUIT

A. PVC conduit shall be manufactured by WHEATLAND, TRIANGLE REPUBLIC or approved equal.

B. Description: NEMA TC 2; Schedule 80 PVC.

C. Fittings and Conduit Bodies: NEMA TC3.

2.03 ELECTRICAL METALLIC TUBING (EMT)

A. Electrical metallic tubing shall be WHEATLAND, TRIANGLE, REPUBLIC, or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR, or approved equal. Catalog numbers used below are those of THOMAS & BETTS CORP. based on 3/4-inch size and are considered standards by which equivalents are to be judged.

C. EMT connectors shall be TC-2125C compression type with threaded locknut. Set screw connectors will not be acceptable.

D. EMT couplings shall be TK-2125C compression type. Set screw connectors will not be acceptable.

2.04 METAL CLAD CABLE (MC)

A. Metal clad cable shall be manufactured by BICCGENERAL or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR or approved equal.

C. Conductors shall be types THHN and THWN. Ground wire shall be sized as per NEC with green THHN/THWN insulation. All conductors shall be cabled and wrapped in polyester tape. All conductors shall be rated for 600 VAC.

D. Armor material shall be Aluminum Interlocked Armor.

E. MC Cable shall be rated for use in air plenums.

2.05 SURFACE MOUNTED RACEWAY (WIREMOLD)

A. Manufacturer: Wire Mold shall be manufactured by LEGRAND or approved equal.

B. Model: 700 Series - One-Piece Steel Surface Raceway.

C. Paint wire mold to match existing wall color.

D. UL5 and ADA compliant.

E. UL and cUL Listed.

2.06 DUCT SEAL

A. RectorSeal or approved equal.

B. Model #: 81881

2.07 J-HOOKS

A. TO BE USED ABOVE FINISHED CEILING ONLY. FOR TELEPHONE, PA, CAT 6 DATA AND FIRE ALARM CABLE ONLY. ALL EXPOSED TELEPHONE, PA, CAT 6 DATA AND FIRE ALARM CABLE SHALL BE IN CONDUIT.

B. Erico Caddy HP J. Hook Series or approved equal.

C. Provide wire retainers for all.

D. Provide mounting hardware and accessories as required.

E. Spacing of J-Hooks and supports shall not exceed 5’-0” on center.

2.08 FLEXIBLE LIQUID-TIGHT METAL CONDUITS AND FITTINGS

A. Liquid-tight flexible metal conduit shall be ANACONDA or approved equal.

B. Description: Interlocked steel construction with PVC jacket.

C. Provide flexible liquid-tight conduits and fittings as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO. or approved equal. Catalog numbers used below are those of the THOMAS & BETTS CORP., based on 3/4" size and are to be considered as standards by which equivalents are to be judged. All conduit shall be liquid-tight flexible type, UL type UA, or suitable for exposure to continuous or intermittent moisture.

D. Flexible liquid-tight connectors shall be Series 5333 or approved equal.

2.09 OUTLET AND DEVICE BOXES

A. Acceptable Manufacturers: Raco, General Electric or approved equal.

B. Sheet Metal Outlet Boxes - All concealed boxes shall be NEMA OSI, galvanized steel:

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported. Provide 1/2" male fixture stubs where required.

C. Concrete Ceiling Boxes: Concrete type.

D. Cast Boxes: All exposed surface mounted boxes shall be NEMA FB1, Type FD, cast feralloy. Provide gasketed cover by box manufacturer.

2.10 PULL BOXES

A. All pull boxes used for this project shall be minimum Oldcastle DB-B3-6 or specifically approved equal for all customer installed power and control circuits.

B. Provide H-20 Cast-Iron Traffic Load Cover. Cover shall have 3” high logo “Electric”.

2.11 JUNCTION BOXES

A. Acceptable Manufacturers: RACO, GENERAL ELECTRIC or approved equal.

B. Sheet metal boxes: NEMA OS1, galvanized steel.

C. Covers: Galvanized steel.

2.12 WIRE TROUGH

A. Wireways shall be manufactured by Square D, Class 526, rain tight trough or approved equal.

B. Wireway shall be completely enclosed with removable covers.

C. Construction: 16 Gauge Galvanized Steel. 8-inch and 12-inch wire trough shall be 14-gauge galvanized steel.

D. Finish: ANSI-49 epoxy paint applied by cathodic electro-deposition paint process over a corrosion resistant phosphate preparation.

E. UL listed.

2.13 EXTERIOR WIRE TROUGH

A. Wireways shall be manufactured by SQUARE D, Class 526, rain tight.

B. Wireway shall be completely enclosed with removable covers.

C. Construction: Wireway shall be constructed of Type 304 stainless and shall have stainless steel screw clamps, and oil resistant gaskets.

D. All hardware, bolts, brackets, and supports shall be constructed of Type 304 stainless steel.

2.14 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT THREAD COMPOUND

A. KOPR-SHIELD or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF CONDUITS

A. Minimum size of conduits shall be 3/4-inch.

B. Minimum conduit depth shall be 24" below grade, measured to the top of the conduit on exterior underground installations.

C. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors and fittings.

D. All threaded conduits and fittings shall have KOPR-SHIELD compound applied to all threads prior to assembly.

E. Make bends or offsets with standard ells or field bends with an approved bender.

F. Run concealed conduits in direct line with long sweep bends or offsets. Run exposed conduits parallel to and at right angles to building lines. Group multiple conduit runs in banks.

G. Secure conduits to all boxes and cabinets with double locknuts and bushings so system will be electrically continuous from service to all outlets.

H. Install conduit in accordance with NECA Standard of Installation.

I. Cap ends of conduits to prevent entrance of water and other foreign material during construction.

J. Complete all conduit systems before pulling conductors.

K. Support conduits under provisions of Section 260529.

L. Provide approved expansion joints or fittings and bonding jumpers where conduits in concrete pass through building expansion joints.

M. Provide cable supports in conduits rising vertically in accordance with the National Electric Code, Article 300-19.

N. Provide No. 12 AWG copper pull wires or nylon cord in all empty conduits. Steel wire not acceptable as pull wire.

O. Install conduit to preserve fire resistance rating of partitions and other elements.

P. Ground and bond conduit under provisions of Section 260526.

Q. Where neither length of conduit can be rotated, ERICKSON couplings Series 676 shall be used.

R. In areas where enclosed and gasketed fixtures and weatherproof devices are specified, where rigid conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in a threaded hub, a steel, or malleable iron nylon insulated bullet hub, complete with recessed sealing "O" ring, shall be used, Series 370-379. DO NOT use die cast material.

S. Conduits shall not be installed within concrete slabs unless specifically noted in contract documents; no exceptions.

T. Where conduits running overhead pass through building expansion joints, install flexible liquid tight conduit of same size with sufficient slack to allow conduits on either side of expansion joint to move a minimum of 3-inches in any direction. Provide supports as required on each side of expansion joint, all in accordance with seismic requirements of specific area.

U. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring servicing shall be readily accessible.

V. Arrange supports to prevent misalignment during wiring installation.

W. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

X. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

Y. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

Z. Do not attach conduit to ceiling support wires.

AA. Arrange conduit to maintain headroom and present neat appearance.

BB. Route exposed conduit parallel and perpendicular to walls.

CC. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

DD. Route conduit in and under slab from point-to-point.

EE. Maintain adequate clearance between conduit and piping.

FF. Bring conduit to shoulder of fittings; fasten securely.

GG. Use conduit hubs with sealing locknuts to fasten conduit in damp and wet locations.

HH. Install no more than equivalent of three 90-degree bends on interior locations between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2-inch size.

II. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

JJ. Do not use dissimilar strap or clamp supports. Provide dielectric tape, fittings, straps, and bushings where dissimilar metals are used.

KK. Where fittings for liquid-tight flexible conduit are brought into an enclosure with a knockout, a gasket assembly, consisting of one piece "O" ring, with a Buna-R sealing material, Series 5200, shall be installed on outside of box. Fittings shall be made of either steel or malleable iron only, and shall have insulated throats or insulated bushings.

LL. A copper ground wire sized in accordance with NEC shall be installed on the inside of the conduit as a jumper around flexible conduit to assure a continuity of ground.

MM. Install a copper jumper across all flexible conduit including lighting fixtures, controls and other utilization equipment.

NN. Install liquid-tight flexible conduit in such a manner as to prevent liquids from running on surface toward fittings.

OO. Allow sufficient slack conduit to reduce the effect of vibration.

PP. Complete all conduit systems before pulling the conductors.

QQ. Support in accordance with requirements of National Electric Code.

3.02 INSTALLATION OF BOXES

A. Install boxes concealed in finished walls.

B. Locate boxes to prevent moisture from entering or accumulating within them.

C. Support boxes independently of conduit, as required by the National Electric Code.

D. Provide 4" x 1-1/2" octagonal, 4" x 1-1/2" square or 4" x 2-1/8" square ceiling outlet boxes.

E. Where required to hang a specific fixture, provide a fixture stud of the no-bolt, self-locking type on ceiling outlets.

F. Provide 2-1/2" x 3-3/4" one gang masonry boxes for switches and receptacles installed concealed in concrete block walls. For increased cubic capacity, provide 3-1/2" x 3-3/4" one gang masonry boxes. Where more than two conduits enter the box from one direction, provide 4" square boxes with square cut device covers not less than 1" deep specifically designed for this purpose. Use round edge plaster rings only if the block walls are to be plastered. Use sectional or gang-type outlet boxes only in drywall construction.

G. Provide 4-11/16" square outlet boxes with square cut device corners for block walls or round edge plaster rings for plastered walls for telephone outlets. Single gang device boxes are not acceptable.

H. Provide fittings with threaded hubs for screw connections and with the proper type covers for switches and receptacles served by exposed conduit. Use pressed steel outlet only for ceiling fixture outlets.

I. Provide condulets with threaded hubs and covers and with proper configurations for all changes of direction of exposed conduits. Standard conduit ells may be used if they do not interfere or damage or mar the appearance of the installation.

J. Use boxes of sufficient cubic capacity to accommodate the number of conductors to be installed, in accordance with the National Electric Code.

K. Effectively close unused openings in boxes with metal plugs or plates.

L. Set boxes so that front edges are flush with finished surfaces.

M. Support boxes from structural members with approved braces.

N. Install blank device plates on outlet boxes left for future use.

O. Provide bushings in holes through which cords or conductors pass.

P. Install boxes so that the covers will be accessible at all times.

Q. Electrical boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only in each framing space and that openings do not exceed 16 square inches. All clearance between such boxes and the gypsum board shall be completely filled with joint compound or approved fire-resistive compound. The wall shall be built around outlet boxes larger than 16 square inches so as not to interfere with the wall rating.

3.03 INSTALLATION OF PULL BOXES, JUNCTION BOXES AND WIRE TROUGHS

A. Provide junction boxes as shown on Drawings and otherwise where required, sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4-inch square and 2-1/8-inches deep. Provide screw covers for junction boxes.

B. Install boxes in conduit runs wherever necessary to avoid long runs or too many bends. Do not exceed 100-foot runs without pull boxes. Install pull boxes at all 90-degree bends.

C. Rigidly secure boxes to walls or ceilings. Conduit runs will not be considered adequate support.

D. Install boxes with covers in accessible locations. Size boxes in accordance with the National Electric Code.

E. Do not install pull boxes or junction boxes for joint use of line voltage and signal or low voltage controls unless all conductors are insulated for the highest voltage being used in the same box.

F. Coordinate installation of exterior pull boxes with General contractor to establish elevations of finished grades and pavements. All castings shall have chimney adjustment of + 6”.

3.04 CONDUIT LOCATIONS

A. Route all conduit concealed in walls or above finished ceilings. Provide boxes and conduits concealed in walls for all power and controls. Conduit will not be permitted within new floor slab at treatment building.

B. Surface mounted conduits will only be allowed in unfinished space.

C. Surface mounted raceway (wiremold) conduit will only be allowed on finished block walls or on plaster walls, where conduit cannot be run concealed. All horizontal runs shall be installed above finished ceilings, where drop ceilings are located.

D. All conduit shall be primed and painted to match existing adjacent wall color.

E. J-Hooks are only permitted to be used above finished ceilings CAT 6 data cable.

END OF SECTION

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Nameplates and labels.

B. Wire and cable markers.

C. Conduit markers.

1.02 REFERENCES

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. Submit under provisions of Section 013300 - SUBMITTALS.

B. Product Data: Provide catalog data for nameplates, labels and markers.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Underwriters Laboratories, Inc. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.

B. Locations:
   1. Distribution Panelboards.
   2. Disconnect Switches..

C. Letter Size:
   1. Use 1/4 inch (6 mm) letters for identifying all control pilot lights.

D. Labels: Embossed adhesive tape, with 3/16” (5mm) white letters on black background. Use for identifying existing equipment, distribution panels, switchboards, disconnect switches, and individual electrical devices.

2.02 WIRE MARKERS

A. Manufacturers:
   1. 3M ELECTRICAL SPECIALTY DIV., Product Scotch Code.
   2. THOMAS & BETTS CORP., Product E-Z Code.
   3. Substitutions shall be permitted only after receiving written approval from the Engineer.

B. Description: Epoxy film tape type wire markers.

C. Locations: Each conductor at panelboards, auxiliary gutters, pull boxes, outlet and junction boxes, circuit breakers and each load connection.

D. Legend:
   1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2.03 CONDUIT MARKERS

A. Manufacturers:
   1. THOMAS & BETTS CORP.
   2. Substitutions shall be permitted only after receiving written approval from the Engineer.

B. Description: Self-sticking vinyl; black letters on orange background.

C. Location: Furnish markers for each conduit longer than 6 feet (1.8 m).

D. Spacing: 20 feet (6 m) on center.

2.04 UNDERGROUND WARNING TAPE

A. Manufacturers:
   1. THOMAS & BETTS CORP., Model NAF-0700.
   2. Substitutions shall be permitted only after receiving written approval from the Engineer.

B. Description: 6 inch (150 mm) wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.02 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Secure nameplate to equipment front using screws, rivets or adhesive.

C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

D. Apply conduit markers at 20 foot (6 m) intervals.

E. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches (75 mm) below finished grade.

3.03 ELECTRICAL EQUIPMENT IDENTIFICATION

A. The Contractor shall identify all existing circuits in existing distribution panels, switchboards and disconnect switches to remain.

B. Label all circuits identifying the load served including all individual circuit breakers.

C. Label all new circuit breakers and switches used for new feeder and branch circuits.

D. Contractor shall furnish a minimum of 5 custom engrave three-layer laminated plastic labels with up to 20 words per label as directed by the engineer/owner in addition to the required labels for all pilot devices, switches, controls and timers.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Dry type transformers.

1.02 RELATED SECTIONS

A. Section 260533 - Raceways and Boxes for Electrical Systems.

B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.

C. Section 260526 - Grounding and Bonding for Electrical Systems.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NEMA ST20 - Dry Type Transformers for General Applications.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA and impedance ratings and characteristics, tap configurations, insulation system type and rated temperature rise.

1.05 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Dry type transformers shall be manufactured by General Electric Type QL.

B. Approved equal.

2.02 EQUIPMENT REQUIREMENTS

A. Three-phase and Single-phase general purpose dry type transformers be self-cooled, with ratings (KVA) as indicated on the drawings.

B. Shall meet or exceed DOE 2016 efficiency requirements.

C. Copper windings.

D. Sound levels not to exceed the following:

1. 0-9 KVA: 40 db.
2. 10-50 KVA: 45 db.
3. 51-150 KVA: 50 db.
4. 151-300 KVA: 55 db.
5. 301-500 KVA: 60 db.
6. 501-700 KVA: 62 db.

E. Three-phase transformers rated above 15 KVA to be insulated with UL listed Class 220 rated materials; and have a maximum average full load temperature rise of 115 degrees C.

F. Transformers to have voltage ratios as indicated on drawings. Transformers between 15 KVA and 300 KVA to be provided with six 2-1/2% full capacity taps, two above and four below primary rated voltage.

G. Nameplate: Include transformer connection data.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install transformers in accordance with manufacturer's recommendations.

B. Provide both primary and secondary protection as shown on drawings.

C. Set transformer plumb and level.

D. Provide grounding and bonding in accordance with provisions of Section 260526.

E. Transformers 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. Check for damage and tight connections prior to energizing transformer.

B. Measure primary and secondary voltage and make appropriate tap adjustments.

END OF SECTION